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STRATEGY SERIES

No 7

The Canadian Banking Sector

SECTORAL TECHNOLOGY STRATEGY SERIES

NO. 7 THE CANADIAN BANKING SECTOR

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Highlights

- Canadian banks are one of four traditional pillars of the Canadian financial services industry, the others being trust companies, insurance companies, and investment dealers. With the traditional divisions between these four classes of firms blurring, for the purposes of this report the banking sector includes banks, trust companies, and "near banks," such as credit unions and caisses populaires.

- The Canadian banking sector is currently profitable, and it enjoys great stability and integrity. However, the high costs of long-distance telecommunication in Canada, caused by a regulated environment that favours local callers, are a threat to the industry's profitability.

- The Canadian banking sector very skilfully uses high-technology equipment and services in its day-to-day operations. From a technological viewpoint, the sector offers a high-quality, world-class service to its current clientele, both individuals and institutions.

- Among the best examples of the Canadian sector's use of technology are:
  1) distributed on-line processing, which allows individual branches to offer personal service but also provides linkages to other units so as to allow truly national service;
  2) highly sophisticated networks of automated banking machines (ABMs); and
  3) interbank links to allow access to personal accounts from different cooperating banks' ABMs.

- The sector supplies these benefits through both technology from its own R&D (which is heavily oriented toward development) and hardware and software procured from suppliers. Overall, the second factor makes the sector a major indirect supporter of technology.

- It is not possible to compare Canadian R&D expenditures directly with those of offshore competitors owing to different definitions of R&D among firms and different banking structures among countries. However, the figures that exist imply that the overall Canadian commitment to technological development is relatively close to that of its principal competitor, the industry in the United States. Canadian banks in general believe their technology is competitive and their technological investments are adequate.

- Canadian banks follow a principal technology strategy of adopt and adapt. In particular, they modify proprietary hardware or software platforms to suit the Canadian market and their own specific needs. The range of products and services offered by Canadian banks are practically indistinguishable from one another at present, partly because of this strategy.

- Thanks to anticipated Canadian deregulation, the range of services that Canadian banks or subsidiaries may offer their clientele will expand in the near future. This is likely to include insurance and securities trading. This will expand the opportunities for banks to develop and procure still more hardware and software and, accordingly, provide that much more support to technology-based suppliers. Even if banks purchase existing insurance and securities firms, the banks' in-depth expertise in information technology and hardware and software platforms is likely to allow economies of scope, with enhanced and new services in all areas.

- Deregulation will also likely move the Canadian banking sector closer to an innovation technology strategy, as it would provide significant opportunities for new product lines.

- The principal market for Canadian bank services is currently within Canada, although the Canadian banking sector has significant export potential for its services into the United States and some overseas markets. Although the Canadian market will continue to be very important, the global banking market is likely to be equally or even more important in the long run. At present several Canadian banks are making strong attempts to enter foreign markets. Indeed, Canadian banks already have more than 200 branches in the United States. Canadian banks are likely to continue this process to capitalize on their growth potential.

- Among other developments, a major issue facing Canadian banks for the future is the relationship between themselves and selected corporate customers. Canadian banks cannot normally establish a so-called merchant-banking or investment-banking role for themselves, although such a role may be emerging as a major lucrative — although undeniably controversial — role for U.S., Japanese, British, and continental European banks. Under proposed deregulation, Canadian banks would be allowed to play such a role. And they must do so, although it is very challenging, or they will likely find themselves limited to less profitable (although perhaps more stable) ventures such as consumer banking. In other words, Canadian banks will need to be able to discriminate among potential customers to identify growth markets.

- Although technology has not caused the creation of this new merchant banking role, very often it has caused the global economic changes positively or negatively affecting the fortunes of so many firms. However, Canadian banks' experience with the financing needs of large, technology-driven growth firms is limited, owing to the structure of the Canadian economy. If, in the future, technology-based firms grow disproportionately faster than the global economy as a whole — and the evidence is that they grow about twice as fast — then banks without such clientele will inevitably lose market share. One benefit of Canadian banks entering foreign markets is that they would acquire such experience. This might have important spin-offs for their domestic Canadian operations and hence benefit Canadian technological development overall.

- There is a considerable debate within the banking sector about how to respond to emerging global economic changes; this debate is manifesting itself, to a certain extent, on the role of scale economies and level of competition within the Canadian sector. Some analysts appear to favour a more rationalized structure with fewer but bigger financing units. From a technological development perspective, the changing global economy, featuring rapid growth in the international trade of new technology-intensive products, suggests this approach has merit.

- As a first step, the Canadian banking sector could establish an explicit technology-intelligence capability parallel to, but expanding on, the analysis function currently undertaken by investment dealers. Although this is partially accomplished already, through mergers and acquisitions of stockbrokerage firms by Canadian banks, and Canadian banks do have substantial and knowledgeable economic departments to provide economic intelligence, an explicit technology-intelligence capability is not yet an integral component of Canadian banks' strategic planning.

- To sustain their own growth and support Canadian technological development, Canadian banks should develop the capability to prospect, initiate, structure, and finance explicit deals linking

technology-based growth firms with such customers as resource companies, retail-wholesale trade companies, service-sector firms, and manufacturers. It is not yet completely clear whether Canadian banks need greater scale economies to do this, but the option to rationalize should remain open.

- In the short run, governments do not appear to have a major direct role in supporting the banking sector. However, governments can play an important indirect role by implementing the current proposals for banking deregulation and by deregulating telecommunications so as to lower costs to vital long-distance consumers through increased competition. Governments could also provide valuable intelligence services to banks through their existing industry and technology agencies.

Background to the Sectoral Technology Strategy Series

In the emerging "new" economy of the 1990s, successful high-value businesses in advanced nations are being driven by innovation, propelled by spending on new products and processes. Their business strategies centre increasingly on specialized knowledge and skill in finding the right "fit" between their unique blend of core technologies and particular markets.

Where does Canada stand in this rapidly evolving new environment of changing linkages and relationships? The poor innovative capacity of Canadian industry has long been a concern of the Science Council of Canada, going back to its 1971 report *Innovation in a Cold Climate*. The Council re-emphasized this concern in 1988. It focused its attention on the potential for action at a sectoral level in its statement *A Sectoral Approach to Innovation*. It argued:

> There is growing recognition by industry and government in Canada of the key role played by technology and R&D in domestic and international competition. The Science Council considers that it is primarily the responsibility of industries to raise the degree of domestic technological sophistication and the level of R&D. Nevertheless, governments can help business to sustain long-term competitiveness both by building partnerships with individual firms and by generating consensus on the formulation of innovation strategies for the various industrial sectors. The intent is not for government to tell business what to do, but to facilitate business cooperation in a process of self-help. The process of building consensus on a strategy for a particular sector will involve close and on-going consultation with industries about the current role of technology and R&D in the sector, the opportunities foreseen, and the nature of the sources, stimuli, and forms of technological innovation. Obviously, to be successful, separate innovation strategies will be needed for each sector. The Science Council hopes that the process of building consensus will generate commitment and collective will concerning priorities, areas for cooperation, and agenda for action.

This 1988 statement proved to be an important step in the path that subsequently led the Council to undertake a major Sectoral Technology Strategy project.

In 1989, Industry, Science and Technology Canada, at a time of heightened concern for the state of Canadian competitiveness and serious questioning about the low level of Canada's gross expenditures on research and development as measured against other advanced countries, agreed to provide the main funding for this project. It also stipulated the selection of sectors on which it would like the project to focus.

Each report in this Sectoral Technology Strategy Series draws in part upon analyses commissioned by the Science Council of Canada from contractors, designed to reveal the key dynamics driving technological innovation in the sector and influencing company technology strategies. Each report has also benefited considerably from the comments and advice submitted by the many external reviewers from business, universities, and government, who are recognized in the Acknowledgements.

Commentary on the Sectoral Technology Strategy Series and R&D Targets

The Sectoral Technology Strategy Series has analysed 15 Canadian sectors. On the basis of this experience, the Science Council of Canada makes the following points with regard to Canadian R&D performance and the issue of setting sectoral R&D targets.

- Canadian firms, when grouped by sectors, generally perform much less R&D than their trade competitors. Using the indicator of R&D as a percentage of sales, Canadian firms undertake R&D at a rate about one-third to one-half the rate of their leading international sectoral competitors. The notable exception among those sectors analysed is telecommunications.

- In some product lines or specific technologies certain absolute threshold levels of R&D and capital investment must be reached if the effort is to be considered to have a chance of making a commercial payback. High thresholds are apparent in some parts of sectors such as telecommunications (central office switches), automotive parts ("Tier 1" supplier status), oil and gas (reformulated-gasoline standards by refineries), and electronics (integrated-circuit foundry). Such absolute thresholds cannot be clearly expressed as a percentage of sales.

- The reasons for the lower level of R&D spending by firms in most of the 15 Canadian sectors are: choice of business and technology strategy (which, in part, leaves Canadian companies as essentially nonparticipants in many higher value-adding segments); the relatively small size of Canadian firms; the high absolute thresholds of R&D expenditure required to be a meaningful player, especially for innovative technology strategies; and the degree of foreign ownership of Canadian firms (especially important in the case of the automotive-vehicle and -parts sectors).

- The lack of R&D relative to other countries affects Canadian competitiveness, but it is only one of many factors, such as capital and labour costs, quality design, good marketing, and management, that interact to affect overall competitiveness. Nevertheless, the contribution of R&D, or more precisely, technology-based innovation, is becoming more pronounced throughout the global economy, and Canada continues to fall behind. The low level of R&D is especially detrimental to the capacity of Canadian resource-based sectors to compete with higher-value, differentiated products, leaving them vulnerable to adverse shifts in costs beyond their control, such as a higher exchange rate.

- Major potential does exist for Canadian industry to make additional R&D investments. However, fulfilling this potential depends heavily on the vision and capability of management to make strategic use of technology, to speed the firms' innovation process, to work more closely with suppliers and "demanding customers" all the way to the end of the product chain, and to build core capabilities in incremental innovation and R&D. Canadian firms have not yet fully grasped the implications of the emerging new "lean enterprise" or "agile producer" strategy. To follow this new strategy involves seeking to offer maximum value to customers. It requires integrating the skills base of a knowledgeable workforce with flexible management structures that stimulate cooperative initiatives within and between firms to match customer needs.

- The dominant technology strategies being followed by Canadian firms in these sectors are of adopt and adapt. Innovation technology strategies are not very extensive (telecommunications is again an exception), and hardly any firms focus on breakthrough strategies to enhance competitiveness. Overall, these 15 sectors show little attempt at diversification out of existing product lines as opposed to making such products more efficiently.

- Governments can set sectoral R&D targets in the hope of stimulating enhanced industrial performance, shifts in business strategy, and greater commitment by the private sector to R&D. However, private sector R&D is only meaningfully undertaken in conjunction with a full complement of associated private and public sector actions ranging from improved design and production to finance and marketing. Doing more R&D will not be productive unless linked to a broader corporate technology strategy that is carefully designed to support the firm's business objectives. Otherwise, the corporation cannot, and will not, marshal the complementary investments required to reap the benefits of the R&D. It is the firm that must commit R&D resources.

- Setting sectoral R&D targets becomes more difficult as the boundaries between sectors are breaking down through technological advances, regulatory change, and firm restructuring. Larger and more diversified firms that dominate modern industrial R&D perform R&D that might be allocated to any of several sectors. Examples include the textiles and materials R&D performed by large Japanese steel firms, the electronics R&D by automotive-vehicle firms, and the software R&D by telecommunications firms. Canadian governments have quite correctly encouraged higher levels of industrial R&D in Canada. In view of the rapid pace of scientific advances and technological change, plus the role of system interdependencies and synergies between technologies, setting R&D targets does not appear to be a task warranting the intensive effort, cooperation, and, ultimately, commitment that would be required by federal and provincial governments and private sector organizations.

List of Sectoral Technology Strategy Series Reports

No. 1 The Canadian Telecommunications Sector
No. 2 The Canadian Automotive-Parts Sector
No. 3 The Canadian Iron and Steel Sector
No. 4 The Canadian Automotive-Vehicle Sector
No. 5 The Canadian Oil and Gas Sector
No. 6 The Canadian Petrochemicals and Resins Sector
No. 7 The Canadian Banking Sector
No. 8 The Canadian Nonferrous-Metals Sector
No. 9 The Canadian Forest-Products Sector
No. 10 The Canadian Machinery Sector
No. 11 The Canadian Food and Beverage Sector
No. 12 The Canadian Electric-Power Sector
No. 13 The Canadian Consulting-Engineering Sector
No. 14 The Canadian Electronics Sector
No. 15 The Canadian Computer Software and Services Sector

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Introduction

The Canadian banking sector is profitable, and technological innovation is a significant factor in determining its competitive strength. Technology is used for both bank deposits and loans. Technology allows access to necessary credit information, actually transfers funds, and links geographically distant institutions.

Accordingly, banks and bankers need, and use, technology. But how best should banks support technology development? Are they merely passive receivers of it for their own transaction processes, or do they actively take steps to ensure that both they and their clients will be competitive through its intelligent use?

The main objective of this report is to indicate: the technology strategies of the leading banks; the sector's performance in R&D compared with that of our main trade competitors; the major reasons for any differences; and the way these differences affect competitiveness. The report will also comment on some possible future trends in banking and the long-term viability of current technology strategies.

Overview of the Canadian Banking Sector

The Canadian banking sector is profitable and technologically highly advanced in its day-to-day processes. Indeed, by global standards the Canadian banking sector combines quality service and a reasonable return on its shareholders' assets. It has an enviable stability. Moreover, it has significant export potential for its services, at least for the U.S. and some other markets. But the rapid development of technology has had massive impact on the global economy. Considerable debate is emerging within the Canadian banking sector about the ways in which technology is changing the global economy and how Canadian banks can best respond to those changes. Moreover, the evolution of global banking also suggests that there may be a significant new role for banks in technology development. Accordingly, the challenge to the Canadian banking sector is not likely to diminish.

A bank may be defined as "an establishment for the custody of money received from, or on behalf of, its customers. Its essential duty is to pay their drafts (cheques) on it; its profits arise from the use of the money left unemployed by them."[1] In other words, a bank takes in money (deposits) and then gives it out again as loans, usually to a completely different set of customers. It is an intermediary, linking those who wish to save with those who wish to borrow. Naturally the bank charges a higher rate of interest to those who borrow than it pays to those who save. This has traditionally been its source of profit.

However, banking operations and activities continue to evolve. Increasingly, banks are relying on fee income, for various value-added services, to augment their interest income. One Canadian bank, for example, has seen its fee income rise from 24 per cent of net interest income to 42 per cent in the last 10 years. Some U.S. banks now make most of their income from various specialized service fees.

Banks are invariably regulated to some degree. Governments establish precisely what lines of business banks are allowed to offer. These laws also act to restrict access to the market and hence reduce competition.

A major reason for government regulation of banking is the desire to protect the finances and interests of depositors. After all, any commercial firm can go bust. Then its shareholders will lose their investment. But a financial firm, like a bank, in effect uses depositors' money to stay in business. If it becomes bankrupt, not only do its shareholders lose their investment but also its depositors lose their savings.

The effect of Canadian regulation has been to differentiate financial services. In Canada, the banks became one of the so-called four pillars of financial services.[2] These four pillars are:

- *Banks* — These institutions take in deposits, provide safekeeping facilities, and give out loans. This group also includes the so-called near banks such as credit unions and caisses populaires.[3]

- *Trust companies* — These firms have many of the characteristics of banks and can be considered as being in the banking sector. But they also have the right to engage in trust services, that is, to act as trustee in charge of corporate or individual assets such as property, stocks, or bonds.[4] In the United States and the United Kingdom, the property role is undertaken by savings and loans companies ("S&Ls") and building societies, respectively, but the function is the same.[5]

- *Investment dealers* — These firms underwrite and trade in securities (e.g., stockbrokers).[6]

- *Insurance companies* — These firms underwrite and sell insurance policies.[7]

The focus of this report is the banking sector, including trust companies and the near banks. This sector is by far the largest (by size of assets) of the Canadian financial pillars.

Structure of the Canadian Banking Sector

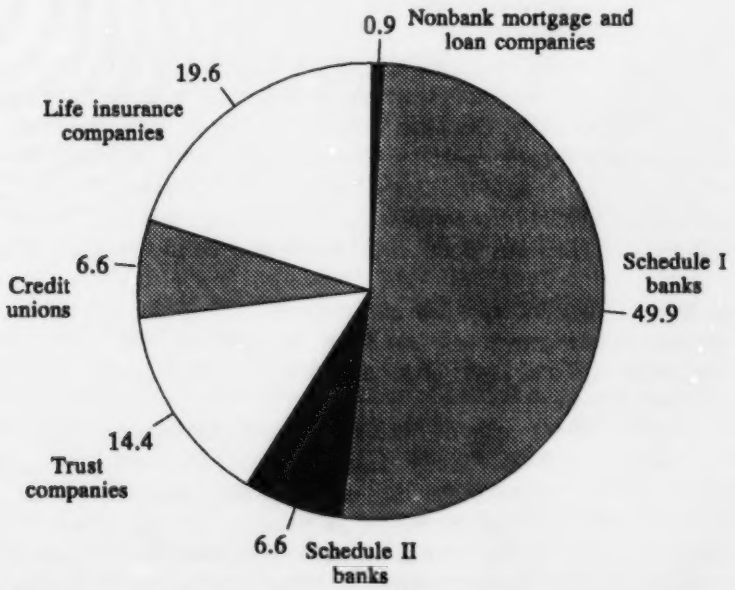
The Canadian banking sector in turn comprises four types of institutions:

- domestic banks;
- foreign bank subsidiaries;
- trust companies; and
- cooperative credit unions and caisses populaires.

The total assets of the Canadian banking sector's institutions were $689.4 billion in 1988.[8] Not all of these assets were held in Canada — in fact, the total foreign assets of the Canadian banking system amounted to approximately $200 billion. The distribution of the total assets is shown in Figure 1. It can be seen that Schedule I banks, which control 49.9 per cent of total Canadian assets, dominate the Canadian financial industry.

Canadian banks and foreign bank subsidiaries are chartered by Parliament and operate under the provisions of the *Bank Act*, which establishes requirements for incorporation and bank reserves and generally sets out what a bank may or may not do. The act is revised approximately every 10 years. There have been 10 major revisions since the act's inception in 1871, the last being in 1980.[9] The latest proposed revision received royal assent in 1991,[10] but as of the end of the year it had not yet been enacted.

Figure 1. Percentages of total Canadian assets held by Canadian financial institutions (1988)



Source: Statistics Canada

The *Bank Act* governs two types of banks: Schedule I, which are domestically owned and widely held; and Schedule II, which are mostly foreign owned with concentrated ownership. (There is one domestic Schedule II bank.)

Schedule I banks are among the oldest surviving companies in Canada. The six big banks (Royal Bank of Canada, Canadian Imperial Bank of Commerce, Bank of Montreal, Bank of Nova Scotia, Toronto-Dominion Bank, and National Bank) account for nearly one-half of the assets of Canadian financial institutions. They have achieved their present size largely by establishing (as of 30 April 1991) a network of 7454 retail chartered bank branches throughout Canada.[11]

Schedule I banks offer the widest range of banking services. The principal ones are deposits, loans, securities and foreign-exchange transactions, and safekeeping services.

The *Bank Act* stipulates that no single investor can hold more than 10 per cent of the shares in a Schedule I bank, and foreign ownership in the aggregate is limited to 25 per cent of the shares. The latter provision, however, does not apply to U.S. owners after the Canada-U.S. Free Trade Agreement. Nevertheless, the provision that shareholders must not be related to one another directly or indirectly beyond a 10 per cent ownership level does apply to them also.[12]

Schedule II banks were brought under the provisions of the *Bank Act* when it was revised in 1980. Although subsidiaries of foreign banks had operated in Canada for several years, this revision subjected them to the same reserve requirements, government regulations, and scrutiny as the Schedule I banks.

Schedule II banks can engage in all of the types of business permitted to a Schedule I bank. In practice, however, most Schedule II banks focus on commercial loans to companies rather than on retail banking services to individuals. The size of any individual loan they make must be related to the capital base of the subsidiary rather than to that of the parent bank, thus limiting the ability of Schedule II banks to extend large loans. Moreover, because these banks lack extensive branch networks in Canada, they seek deposits mainly from corporations rather than individuals. They raise additional funds by issuing financial paper in the money market.[13]

The Schedule II banks were initially restricted to no more than 8 per cent in total of the domestic assets of the Canadian banking system. That plateau was reached in 1989, however, and the limit was raised to 16 per cent. Following the signing of the Canada-U.S. Free Trade Agreement, it was reduced to 12 per cent, but U.S. investors were also then treated as domestic investors and allowed much freer general access to the Canadian banking market. As of September 1990, 55 foreign banks had been granted Schedule II banking status. The total assets of Schedule II banks in 1990 were approximately $53 billion, or 9 per cent of the total Canadian banking assets.[14]

Various federal and provincial trust companies' and mortgage loan companies' acts, as well as the *Income Tax Act*, govern Canadian trust companies, which may be incorporated under federal or provincial laws.

The first trust company was incorporated in Canada in 1872. From only 14 in 1900, the number of trust companies has now grown to about 80, with more than 1050 full-service branches and more than 650 real-estate offices. Total assets under administration by federally regulated trust companies now exceed $140 billion.[15]

Trust companies offer a broad range of financial services that in many cases overlap the services provided by chartered banks. They accept deposits, issue term certificates, grant personal and mortgage loans, and sell registered retirement savings plans (RRSPs) and other tax-deferral plans. Trust companies also provide services to corporations: the transfer and registration of share certificates, disbursement of dividends and other shareholder services, bond trusteeship, and pension-plan trusteeship. Trust companies are the only corporations in Canada authorized to engage in trust business (that is, to act as a trustee in charge of corporate or private assets such as property, stocks, or bonds).

Credit unions and caisses populaires are consumer-owned financial institutions that provide a variety of saving and loan vehicles, chequing privileges, financial counselling, travellers cheques, and safety deposit facilities.

The Canadian Co-operative Credit Society and the Confédération des caisses populaires et d'économie Desjardins du Québec act on behalf of the Canadian movement to clear cheques, invest surplus funds from members, and provide loans to members when required. The Canadian Co-operative Credit Society represents eight provincial central credit unions. These provincial central credit unions form the second tier of the Canadian credit union system and provide various services including liquidity, data processing, and marketing. Confédération Desjardins represents the caisses populaires and caisses d'économie in Quebec.

At the end of 1989, there were 2800 credit unions and caisses populaires in Canada, with a combined membership of 9 million and assets totalling $67 billion.[16]

In terms of total assets, Canadian banks are big by North American standards, but not by European or Japanese ones (see Table 1). Canada's largest bank, the Royal Bank, has assets of $110 billion (1988), which would make it third or fourth largest in the United States (depending on exchange rates and recent U.S. mergers). The next largest Canadian banks, the Canadian Imperial Bank of Commerce, the Bank of Montreal, and the Bank of Nova Scotia, all have assets of more than U.S.$50 billion. Accordingly, they would be well represented in the North American top 20 by size. By contrast not even the Royal Bank is anywhere near the size of Japan's top 10, although it would be close to 10th in Europe's list.

Compared with banks in other leading industrialized countries, Canadian banks earn a slightly below average return on assets, trailing those in the United Kingdom and the United States, equalling those in Japan, and leading those in France.[17] Canada's two largest banks ranked among the top 30 in the world in 1989 on the basis of net income. The Royal Bank is 23rd; the Canadian Imperial Bank of Commerce is 29th.[18] The overall compound annual growth rate in assets was 8.6 per cent over the period 1983-1988.[19] Overall, the growth and return on assets in the Canadian banking sector would seem to be roughly comparable to those in other countries on average.

The Canadian financial industry continues to be dominated by domestic Schedule I banks, which in 1988 controlled 49.9 per cent of total assets of the financial sector in Canada, although that share had dropped from 60.8 per cent in 1983.[20] Virtually all other types of institutions made gains. Life insurance companies (companies that are incorporated under the laws of Canada for the purpose of carrying on the business of life insurance) increased their share from 15.8 per cent to 19.6 per cent; trust companies jumped from 11.1 per cent to 14.4 per cent; credit unions expanded from 6.5 per cent to 8.6 per cent, and Schedule II banks rose from 3.9 per cent to 6.6 per cent.[21] Over the same period, large trust companies grew at a rate two to three times that of the largest chartered banks (see Table 2).

The Regulatory Environment

The Canadian banking sector is regulated by a number of federal and provincial acts, and related statutes and legislation, which are subject to ongoing review and revision.

The sector is regulated in its overall ability to expand credit by Canada's central bank, the Bank of Canada,[22] which exercises a broad controlling influence over the growth of money and credit in Canada. Created in 1934, the Bank of Canada operates with a large measure of independence. The *Bank of Canada Act* provides for regular consultation between the Governor of the Bank of Canada and the Minister of Finance, and a formal procedure does exist whereby the government may issue a directive to the Bank of Canada on the monetary policy to be followed (for example, to lower interest rates and expand the money supply), although in practice such a directive has never been issued.[23]

Table 1. Top 10 banks in the United States, Europe, and Japan, ranked in each region by total assets and net income (1988, 1989)

United States*		Europe†		Japan‡	
By total assets	(billion $)	*By total assets*	(billion $)	*By total assets*	(billion $)
1 Citicorp	230.6	1 Groupe crédit agricole	214.4	1 Dai-Ichi Kangyo Bank	389.8
2 Chase Manhattan	107.4	2 Banque nationale de Paris	197.0	2 Sumitomo Bank	378.9
3 BankAmerica	98.8	3 Barclays Bank	189.4	3 Fuji Bank	366.8
4 J.P. Morgan	89.0	4 Crédit Lyonnais	178.9	4 Mitsubishi Bank	353.9
5 Security Pacific	83.9	5 National Westminster Bank	178.5	5 Sanwa Bank	351.0
6 Chemical Banking	71.5	6 Deutsche Bank	170.8	6 Industrial Bank of Japan	259.5
7 NCNB Corporation	66.2	7 Group Écureuil	150.3	7 Norinchukin Bank	243.8
8 Manufacturers Hanover	60.5	8 Société générale	145.7	8 Tokai Bank	222.9
9 First Interstate Bancorp	59.1	9 Dresdner Bank	129.7	9 Mitsui Bank	207.6
10 Bankers Trust	55.7	10 Paribas	121.6	10 Bank of Tokyo	199.7
By net income	(million $)	*By net income*	(million $)	*By net income*	(million $)
1 BankAmerica	1 103.0	1 National Westminster Bank	1 705.2	1 Sumitomo Bank	1 580.9
2 Security Pacific	740.6	2 Barclays Bank	1 613.1	2 Dai-Ichi Kangyo Bank	1 506.1
3 Wells Fargo	601.1	3 Lloyds Bank	1 116.3	3 Fuji Bank	1 397.1
4 Citicorp	498.0	4 Banco Bilbao Vizcaya	786.2	4 Mitsubishi Bank	1 313.9
5 NCNB Corporation	447.1	5 Midland Bank	758.7	5 Sanwa Bank	1 226.9
6 PNC Financial	377.4	6 Paribas	732.5	6 Industrial Bank of Japan	707.3
7 Fleet/Norstar Financial	371.3	7 Groupe crédit agricole	679.8	7 Mitsui Bank	590.0
8 Banc One	362.9	8 Deutsche Bank	675.6	8 Mitsubishi Trust	587.0
9 First Chicago	358.7	9 Société générale	590.5	9 Sumitomo Trust	556.7
10 SunTrust Banks	337.3	10 Banque nationale de Paris	534.6	10 Long-Term Credit Bank of Japan	535.6

Source: Keefe, Buyeete & Woods, *The Banker*; and IBCA, as quoted in "International Banking Survey," *The Economist*, London, 7 April 1990.

* Calendar year 1989

† Calendar year 1988

‡ Year ending March 1989

Table 2. Growth of total assets of Canadian financial institutions (1983, 1988)

Financial institution	Total assets (billion $)* 1983	1988	Compound growth rate (%)
Trust companies			
Royal Trustco Ltd.	43.4	96.7	17.5
CT Financial Services Ltd.	46.7	96.6	15.7
Montreal Trustco Inc.	19.3	43.8	17.9
Trustco Ltd. National	15.0	39.6	21.5
Victoria and Grey	14.9	44.3	24.4
Chartered banks			
Royal Bank of Canada	84.1	110.1	5.5
Canadian Imperial Bank of Commerce	68.1	94.7	6.9
Bank of Montreal	63.2	78.9	4.9
Bank of Nova Scotia	54.8	74.7	6.5
Toronto-Dominion Bank	42.5	59.3	6.9
National Bank of Canada	17.8	30.9	11.5
Schedule II banks	3.9	6.6	11.1

Source: Canadian Banker, as quoted in Canada Consulting Cresap, "Banking," contract report prepared for the Science Council of Canada, 1991 (unpublished).

* Including assets of mortgage loan subsidiaries and assets under administration

Until recently, strict regulatory barriers between the four pillars defined the types of service that each could offer and prohibited cross-pillar ownership. Almost without exception, insurance services were restricted to insurance companies, and personal and corporate trust services were restricted to trust companies. The bulk of securities-related services were restricted to investment dealers, and most corporate lending was restricted to banks. Deposit-taking and consumer lending were dominated by banks and trust companies, although insurance companies could in theory (and sometimes did) lend money against established values of policies.

During the past decade, however, significant changes have eroded the distinctions that separated the four pillars. These changes have been driven by a recognition of the complex nature of modern financial institutions and the need for a much greater interrelationship among them.

That recognition was reflected when the federal positions of the Inspector General of Banks and the Superintendent of Insurance were amalgamated into the Superintendent of Financial Institutions in July 1987. The Superintendent of Financial Institutions is responsible for the supervision of banks, trust and loan companies, insurance companies, investment companies, and cooperative credit associations, as well as federally regulated pension plans.

A major regulatory change occurred in 1980, when the *Bank Act* was revised to permit foreign banks to establish subsidiaries and compete directly for business in Canada.

The crumbling of distinctions among the four financial pillars was accelerated in July 1987, when the Ontario government permitted banks, trust companies, and other business interests to take

100 per cent ownership in any of the province's investment firms or to set up subsidiaries in the investment business. (The federal government had also made necessary appropriate changes in its legislation). Foreign investors were permitted to acquire up to a 50 per cent ownership position, with a provision to increase that to 100 per cent in June 1988. As a result, all Schedule I banks have either acquired investment firms or established subsidiaries, while several foreign banks and investment dealers have also set up investment banking subsidiaries.[24]

Regulatory reforms that were originally tabled in the House of Commons by the federal Minister of State for Finance on 27 September 1990 and recently received Royal Assent will further dismantle the barriers between the four pillars. This far-reaching reform of the legislative and regulatory framework governing Canada's federally incorporated financial institutions proposes a number of important changes:[25]

- Banks, trust and loan companies, and insurance companies will be allowed to diversify beyond their traditional areas of business by owning institutions in other segments of the financial services industry; therefore they will be able to compete more directly with each other.

- The new policy will allow, subject to approval, banks to own trust and loan companies; banks and trust and loan companies to own insurance companies; insurance companies to own trust and loan companies; and any widely held regulated financial institution to own Schedule II banks.

- With the opportunity to diversify, financial institutions will be able to offer consumers a wider choice of products and services.

The proposed reforms also address issues pertaining specifically to expanded business powers, networking of services, restrictions on powers, ownership policy, and safeguards. The proposals maintain the 10 per cent limit on ownership of Schedule I banks. They also require large trust companies — those holding more than $750 million in consolidated capital — to have at least 35 per cent of their stock widely held.

These proposals will give trust companies the same commercial and consumer lending powers as banks and will expand those abilities for insurance companies. But equally banks will be able to expand their own activities into total financial services.[26]

From a technology viewpoint, an important revision of the proposed regulations is the provision allowing financial institutions to invest in auxiliary business services companies, specifically including information services companies. This will enhance the information-technology structure of Canadian banks. The banks are likely to be able to make their information services subsidiaries very competitive, thanks to their existing expertise and their hardware and software platforms.

The implications of the revisions to the *Bank Act* are substantial. They amount to what is commonly referred to as "deregulation" and will permit Canadian banks to become total-financial-services firms. In one way or another (e.g., through wholly owned subsidiaries, if not directly), banks will be able to participate in the same financial activities as the other pillars. Although numerous standards relating to financial solvency and responsibility will remain, deregulation conveniently describes the process of changing from differentiated-services to total-financial-services market coverage.

Competition

During the past decade, competition in the financial services sector in Canada has heightened dramatically. As a result, the banks now compete domestically with a range of other financial-services suppliers within each market segment.

The competitive pressures faced by the banking sector are the result of several forces that have been unleashed in recent years:

- Regulatory changes have opened up competition between the banks and near banks.

- Globalization has exposed the Canadian banks' commercial business to competition from large international competing banks. On the other hand, globalization also means enhanced access to new markets, for example, the United States, Mexico, the Caribbean, Europe, and Asia.

- More companies are issuing securities[27] as a less expensive way of raising money than bank loans, thereby eroding the banks' traditional lending role and putting pressure on overall lending rates and particularly interest rate "spreads" (that is, the difference between the interest rate at which the central bank makes funds available to chartered banks and the interest rate the latter can command on loans to their clients in a competitive environment).

- Customers are demanding increasingly sophisticated financial products and convenient service at competitive prices.

This heightened competition is likely to intensify the future role that technology will play.

The Role of Technology

Banking leaders generally share the view that information technology has now become the principal driving force in the banking industry.[28] As Jim Grant, Executive Vice-President, Systems and Technology, Royal Bank of Canada, has been quoted as saying, "Technology is now of strategic importance to the banks, not just something that will help reduce cost or something that will help process a transaction, but it is directly servicing customers."[29] In an era of heightened competition and customer demands for increasingly sophisticated services, the banking sector is rapidly introducing new technologies to reduce operating costs, improve customer service, and thereby increase fee revenues.

In response to the erosion of their traditional lending role on the one hand and the new opportunities provided by deregulation on the other, banks increasingly are focusing on sources of non-interest income from additional fee-based services. Many of these services parallel what investment dealers did in the past, such as provide investment advice, arrange financing for new purchases, sell securities, and so on. To provide these services, banks, particularly the large ones, have made tremendous investments in information-systems technology.

Moreover, in other key areas of technology, such as electronic data networks, the banks have little choice but to be major players, simply because they can't afford not to be. Otherwise, corporations, using their own networks, could do a tremendous amount of debt swapping, bypassing the banks.[30]

As the Canadian sector is deregulated in the future, technology is likely to be a major beneficiary. Certainly, for example, this has been the historical case in the telecommunications sector. After the U.S. long-distance telephone market was deregulated in the early 1980s, many new technology-based products were developed and offered, particularly databases and large private networks. (See Science Council of Canada Sectoral Technology Strategy Series, No. 1: *The Canadian Telecommunications Sector*.) Banks will have an equal opportunity to develop new product lines in a revised regulatory environment.

Distributed On-Line Processing

A particularly noteworthy technology development in the Canadian banking sector is so-called distributed on-line processing. It has received high priority in the sector.[31] It has been driven by several factors: the scarcity of skilled workers; high telecommunications costs associated with central processing; customer demands for convenience and access to information; and the availability of vendor equipment.

Banks have sought ways to employ their existing employees more productively, especially as the demand for skilled workers has increased. One solution has been to place more customer information with the front-line bank tellers in the branches. Distributed on-line processing in the branches has increased the scope of the teller's job,[32] improved customer service, and reduced telecommunications costs (which are five to six times higher in Canada than in, for example, New York State).[33]

Affordable personal computers and minicomputers at the branch level are now powerful enough to handle a wide variety of financial transactions. Several hardware and software vendors have developed off-the-shelf packages (which smaller institutions use) and product platforms (which larger institutions usually modify for their own in-house systems).

It is the view of most people in the banking industry that distributed on-line processing of customer-information files represents the future of banking-system technology.[34]

This is a very profound conclusion if it turns out to be true. It will strengthen the value of the chartered banks' branch networks in Canada.

If individual branches can approximate the information processing capability of a bank's total network (or acquire, through that network, any supplementary data that are required), they can continue to offer all the traditional personalized service that has heretofore been a hallmark of banking, together with all the advantages of modern technological convenience and efficiency.

If distributed on-line processing does not represent the future of banking-system technology, then the likely result will be greater value in centralized systems, such as currently represented by major credit cards (for example, Amex, Visa, MasterCard, Discover). These systems do not really require local bank branches. Moreover, several banks in Canada currently offer lines of credit, which are usually extensions of their credit-card operations and often use compatible numbering, software, and procedures. But unlike most credit cards, these credit lines can be accessed for sizable loans — no longer just for consumer credit but also for unincorporated business financing and even corporate financing. Yet the service is based on a single giant database held in a computer that may be hundreds of miles away from the customer. If such centralization is taken to its extreme logical conclusion, Canada might not need a banking sector at all.

However, the problems American Express Co. is facing with its credit card operations show why the personal service a network of local branches provides is important. The Amex card is well known from its long-standing presence in the travel, recreation, and leisure markets. Amex always tried to ensure its cardholders had superior creditworthiness. However, newer credit cards such as Visa and MasterCard, which are issued by banks, now provide formidable competition. Amex is having trouble differentiating its product. Visa and MasterCard are much more widely accepted and, with their relatively new gold cards, offer essentially as much versatility as Amex. Moreover, Amex recruited many more customers in the 1970s and 1980s and now faces painfully high default rates. Without a local branch network, Amex could not readily discriminate problem customers from good customers without detailed knowledge of the individual — knowledge that comes from a long-standing relationship at a local branch.[35]

Conceivably, the bricks and mortar of Canadian bank branches may not be necessary for banking operations in the future, but the traditional bank branch does have powerful service advantages. And if distributed on-line processing can at least match centralized operations, these branches will continue to be viable.

Computer Technology

During the past decade, the computer industry has seen dramatic improvements in processing and storage capacity, computer languages, and software-development tools. These improvements have made possible a wide array of electronic banking services.

Similarly, in fact, the banking sector in Canada is clearly a major factor in Canadian hardware and software development. A number of computer companies in Canada have played major roles in supplying technology to the banking sector. Notable among them are IBM Canada, GEAC, and Prologic.

IBM Canada

In 1968, IBM Canada developed the first national on-line banking system.[36] IBM followed that in 1971 with an integrated automated-teller system. The major banks used this system until the late 1980s, when it was replaced by a newer version. Around the same time, IBM developed a banking system to replace the on-line version introduced in 1968. By this time, however, several of the major

banks had customized their own systems to the point where it was not economically feasible to switch over to the new version.[37]

IBM is also one of the two hardware and software suppliers for the platform system that supports the automated banking-machine network, Interac. Three of Interac's member institutions chose to go with IBM, while the other six went with ACI (presently TXN Solutions Integrators) and Tandem. The institutions that chose IBM were the Bank of Montreal, Bank of Nova Scotia, and Canada Trust. The six that chose ACI for the software and Tandem for the hardware were the Confédération des caisses populaires et d'économie Desjardins du Québec, National Bank, Royal Bank, Toronto-Dominion Bank, Canadian Co-operative Credit Society, and Canadian Imperial Bank of Commerce.

Looking to the future, IBM's intention for the 1990s is to work closely with financial institutions and software vendors to develop cost-effective applications that will provide vertically integrated and complete banking solutions.[38]

GEAC

GEAC, a Canadian-based hardware and software supplier to libraries and the financial-services industry, is the only mainframe-computer manufacturer in Canada. In partnership with Vancity Credit Union, GEAC in the late 1970s developed GEAC Financial Services, an on-line system for credit unions.

GEAC was very successful in developing banking systems for large credit unions in British Columbia (including the Vancity and Surrey credit unions), as well as some of the large trust companies. The company's early success was the result of the superior technical qualities of the hardware and the customer-information-management capabilities of the software.[39]

As the larger credit unions expanded into multiple locations, however, GEAC ran into problems — problems that it continues to wrestle with today — because its hardware could not be networked. Moreover, GEAC also had problems marketing the system in Canada, and attempts to market the system to the thrifts and savings and loans companies in the United States proved futile because the system was not flexible enough to accommodate multiple interstate banking regulations and reporting requirements.

However, GEAC is attempting to redress any problems with three strategic initiatives: the networking capability of the system has been improved; the software has been rewritten to be compatible with IBM; and the financial software has been sold to CDSL, which will do the program upgrade.[40]

Prologic

Prologic was formed in the mid-1980s by a group of four senior GEAC technicians. Richmond Savings Credit Union worked closely with Prologic to develop a microcomputer-based banking system using GEAC financial-services features. In 1987, Richmond Savings began its conversion to Prologic, and since then other credit unions have followed suit.[41] These credit unions are Kootenay Savings, Cumberland and District, Island Savings, International Woodworkers Association, Fraser Valley, Powell River, C.C.E.C., Ladysmith District, Compensation Employees, K.C.P., Union Bay, Quadra, South Vancouver and District, and Buduchnist.

Prologic's system, which is marketed to all credit unions in Canada and to the thrifts and savings and loans companies in the United States, is targeted at small institutions that need an affordable distributed banking system. It is a distributed system relying on intelligent computer terminals. Like most other banking systems being developed today, Prologic's system is designed to integrate several member accounts into one file. Technology that can allow bank offices to quickly access this information will also help enable the development of merchant banking or investment

banking (for example, like Salomon Brothers in the United States, which advises on and arranges corporate financial deals usually involving the design and issue of securities), which translates into improved service and enhanced cross-selling products.[42]

The system has been well received, and Prologic won the Best in Microbanking Award from *MicroBanker*, an industry newsletter in the United States.

Prologic's success is based in part on their market-driven response to two key factors: the high cost and volume sensitivity of data processing; and the trend toward distributed on-line relationship banking. Much of Prologic's success, however, is contingent on the continued fragmentation in the credit-union system. Accelerating systems integration in the banking industry poses a threat to the competitiveness of Prologic's system, which lacks the capability to integrate with mainframe systems.[43]

Telecommunications

Increases in computing power alone would not have been enough to bring about distributed on-line processing systems. The other key enablers were telecommunications advances that allowed these distributed processing 'islands' to be networked. The importance of telecommunications to the banking sector is illustrated by the fact that the Royal Bank has the largest private telecommunications network in Canada.

The Canadian banking sector is among the heaviest users of telecommunications services in Canada. In 1988, the six largest chartered banks in Canada spent more than $300 million to purchase telecommunications services from telephone companies. Expenditures on telecommunications represent the banks' fastest growing non-interest expense.[44] It is absolutely imperative that telecommunications costs be competitive with those of competitors, for example, U.S. banks, if Canadian banks are to compete in a global banking market.

Telecommunications networks provide the links between all new financial innovations, including automated banking machines, credit-card-authorization networks, electronic data interchange for corporate cash management, foreign exchange trading and treasury functions, and national and international payment settlement networks. All these financial products have been enabled by the rapid strides in telecommunications technology during the past decade, including such advances as modems and multiplexers, digital switching and transmission equipment, and fibre optics.

It is sometimes argued that low-cost telecommunications could be harmful. For example, any labour-intensive manual account-processing activity could be moved offshore to lower-wage countries. Another threat comes from many Canadian subsidiaries of American companies, who are closing their treasury and payroll operations in Canada and transferring them to the United States. Such activities are likely to be moved offshore anyway. The result would be that Canada would likely lose a significant market for telecommunications services and equipment.

Moreover, it is almost certain that future innovations in financial services will depend on continuing advances in telecommunications technology. Some examples of technologies with potential for the future in the banking industry include:[45]

- wide-area networks, which will enable many branches within proximity of each other to be connected;
- video conferencing and video broadcasts, which will reduce travel time and expenses while enabling face-to-face communications between branches;
- very-small-aperture terminals, which are essentially small satellite dishes used for on-line banking in very remote locations; and
- integrated services digital networks (ISDNs), which will make it possible for integrated voice, data, image, and video services to be delivered through a single terminal.

Technological Innovations

As a result of the advances in computing and telecommunications, several new banking products and applications have emerged in the past decade. Some innovations, such as automated banking machines (ABMs), have since become an integral part of today's banking system, others appear to be on the verge of making a breakthrough, and still others appear to be on somewhat shakier ground.

Automated Banking Machines

ABMs have gained widespread acceptance in Canada: about 58 per cent of all banking transactions are now conducted on these machines. As of 31 January 1991, there were some 9195 ABMs in Canada operated by the chartered banks and more than 11 300 ABMs overall.[46] The Royal Bank's ABM network is the largest in North America and ranks in the top 10 worldwide.[47]

ABMs were first introduced in Canada in the 1970s by local cooperative credit institutions, but they gained little customer acceptance, primarily because of their limited functions and lack of on-line access. Their popularity began to grow in the early 1980s, however, when merging computer and telecommunications technologies made on-line access possible.

Initially, several financial institutions developed proprietary ABM networks. By the mid-1980s, however, they realized that the intense competition for prime locations was resulting in considerable duplication of ABM service. Recognizing the benefits to be achieved by coordinating their network expansion, nine of the largest financial institutions in Canada formed Interac in 1984 to coordinate the development and ongoing operations of interbank transfers. These were the Bank of Montreal, Royal Bank, Canadian Imperial Bank of Commerce, Toronto-Dominion, Bank of Nova Scotia, National Bank, Canada Trust, Canadian Co-operative Credit Society, and the Confédération des caisses populaires et d'économie Desjardins du Québec.

Electronic Data Interchange

Electronic data interchange (EDI) allows for electronic communication of storable data without the need for hard-copy material. Although EDI is not well established in Canada, many large banks are actively promoting its benefits to their corporate clients and are in the process of establishing a financial EDI network tailored to the needs of the Canadian business community.[48]

Seven of the largest financial institutions in Canada have joined together to create a common set of standards for the network while each institution develops proprietary software for transactions and information processing with their own customers.

The investment in EDI is being driven by the need to provide faster and more reliable information transfer to customers, to cut costs by reducing paper flow and by using existing telecommunications lines more efficiently, and to increase fee revenues.[49]

EDI is also a response to the threat of competition from nonbank value-added networks, the main ones being IBM, General Electric Information Systems (GEIS), and various telecommunications networks. IBM, for instance, is developing high-security encrypted networks that transmit information between end-users of IBM software and hardware. And GEIS, a large player in Europe, is beginning to market an EDI system that it developed initially for internal use.[50]

EDI is at various stages of development throughout the world. The United States is also pushing hard for EDI because its fragmented banking system makes paper-based transactions very expensive. A few large banks and value-added networks, such as General Motors Acceptance Corporation (GMAC), Ford, Chrysler, Sears, IBM, and GEIS, have developed EDI networks.

France has been the fastest to adopt EDI, mainly because of heavy government funding.[51] In Japan, deregulation in the telecommunications industry has led many banks to expand their EDI services, and four EDI cash-management networks are now in service.[52] In Germany, EDI has been well accepted by corporate customers, but many medium-sized companies feel that the paper-based systems they now have are adequate.[53] In the United Kingdom, the expansion of EDI networks is being driven by the need to improve service and by the threat from nonbank value-added networks.[54] In general, so far Canadian banks have not been able to market their EDI capability, although this could change in the future in a less-regulated environment. Overall, it seems fair to say EDI represents one of the most promising market opportunities for enhanced Canadian banking services, if Canadian banks are allowed to participate, although, as in Germany, the current paper-based payment system is working well and it may take time for smaller companies and individuals to accept it wholeheartedly.

Electronic Funds Transfer at the Point of Sale

Although widely used in Europe and Japan for several years, electronic funds transfer at the point of sale (EFTPOS) debit cards have been slow to take hold in Canada. These debit cards instantaneously debit consumers' accounts when they make a purchase at participating stores. The debit cards provide Canadian consumers with another method of payment besides cash, which currently accounts for 89 per cent of all transactions (credit cards account for less than 3 per cent).[55]

The first major pilot studies were initiated in Canada only in 1989. While all the pilot studies to date have been proprietary, nine of the largest financial institutions in Canada have agreed to work together to establish industry-wide standards. Competition between the institutions will then be based on pricing and promotion.

The debit cards will allow retailers to reduce cash- and cheque-handling costs, and financial institutions will receive additional service fees. Despite the benefits, demand for EFTPOS has been weak because cash and credits are widely available and because retailers are not willing to share the cost of the service with the banks. Nor do retailers want to lose the power they enjoy with their existing credit cards. In turn, this has inhibited banks' efforts to market the system.

Moreover, there are still technological problems with EFTPOS: it is slower than cash transactions; and there can be problems with the durability of the magnetic coding strip on the card. Several 'swipes' of the card in the magnetic 'reader' machine may be needed before a transaction can be completed. This slows down the process even more. Furthermore, it can be difficult for a customer to remember the balance left in his account after a number of EFTPOS transactions, and for security reasons it is difficult to design and incorporate an on-the-spot update capability for balances.

Image Processing

Image-processing systems involve machines that photograph images and convert the images into a digital form. These digital images can then be transmitted down fibre-optic cables to a processing centre and then switched around the clearing system in an electronic form.[56] Image-processing systems are ideally suited to the transaction-based environments of financial institutions.

Although image technology has been available for several years, only a very small amount of paper is processed this way, because of high cost, immature technology, and lack of standards. However, sales of integrated image-management systems to U.S. financial institutions were estimated at $200 million for 1990 and are growing at 40 per cent a year. By 1989, an estimated 50 U.S. banks had already planned or implemented systems based on this technology. In addition, several vendors —

IBM, DEC, Wang, Uniys, Phillips, Kodak, and Olivetti, among others — are currently developing image-processing products.[57]

In Canada, numerous banks use image processing for storing monthly statements.[58]

Home Banking

Although hailed for much of the past decade as the coming revolution in financial services, home banking has failed to take hold, largely because it failed to offer customers value for their money when compared with traditional media and methods. Although several major banks in Canada, the United States, and Europe ran pilot projects, few of these projects now remain.[59]

Bell Canada recently launched ALEX, a comprehensive interactive information service. ALEX serves as a gateway between users and more than 400 providers of information, entertainment, shopping, and financial services. The Confédération Desjardins currently offers applications that provide account balance, activity review, and electronic bill payment via ALEX. To date, the response to ALEX has been mediocre, mainly because of a lack of depth in the services offered.[60]

In the United States, the development of home banking has been severely restricted by federal regulations that prohibit interstate banking. However, IBM and Sears have worked together to develop a home banking system called Prodigy. An estimated 200 000 households are now paying for the service.[61]

As a result of heavy government support, France is the leader in home banking, with more than 4 million users on its Minitel network. Studies are under way to introduce telepayment using smart cards.

In Germany, home banking is provided through the post office's videotext service, BTX, which has been available since 1984. By 1988, however, the home banking service had attracted only 120 000 subscribers. In Japan, several banks are conducting trials using CAPTAIN, a videotext network operated by Nippon Telegraph and Telephone, but home-banking services are not widely used. In the United Kingdom, both screen-based and telephone-based home-banking services are available but also are not widely used.[62]

Smart Cards

Smart cards have an embedded programmable read-only memory chip that enables information to be carried on the card itself (conventional credit cards merely allow access to information stored elsewhere). Smart cards are less susceptible to fraud, can be programmed to provide automatic account deduction, and do not require on-line verification.

Offsetting these advantages, smart cards are 5 to 10 times more expensive to produce than magnetic cards, do not offer clearly significant advantages over current on-line technology, and are hampered by incompatible worldwide access and security standards.

The Royal Bank is the only bank in Canada that has made a substantial investment in smart-card technology. Its smart cards enable corporate clients to use their own personal computers to access on-line cash-management and payroll services offered by the bank. The bank is also using smart cards internally in its security and health-care systems.[63]

With more than 5 million smart cards, France is the leader in this technology. The companies involved in this area include Carte bleu and Crédit groupe agricole.

Expert Systems

Expert systems use artificial intelligence to solve problems. An expert system contains a knowledge base, which is a series of rules governing how a human expert might solve a problem. More flexible than computer systems that use fixed determination approaches, an expert system can account for missing or conflicting information and subjective processes, and it can 'learn' from experience.

The two areas in banking that hold the best short-term potential are repetitive, high-volume production-line decisions and mid-range lending decisions.

One well-publicized example of an expert system is the American Express authorizers' assistant, which provides American Express staff with advice on charge card authorization requests that cannot be approved within normal guidelines. American Express claims the system is saving the company $27 million per year in the United States through increased productivity.[64] It is possible to argue, however, that no expert system can match the understanding of a customer's status and needs as well as a personalized banking relationship.

Although similar in nature, loan authorizations are much more complex. As a result, only a few banks in Canada have been using expert systems, and most of the use has been for training.

International Technology Report

Canada, along with the United States, the United Kingdom, and France, is still heavily dependent on paper-based payment instruments because of the reliance on cheques, whereas Japan and Germany rely heavily on electronic payments. In Canada, just 28 per cent of payments are made electronically. By contrast, 80 per cent of payments are made electronically in Japan and 63 per cent in Germany.[65]

Japan

Payment systems in Japan, in both the corporate and the personal sectors, are rapidly evolving toward a paperless and cashless future.

In the personal sector, a historical aversion to cheques has driven the evolution from cash to electronic payment, bypassing personal cheques. Wages and salaries, for instance, evolved directly from cash to prearranged direct credit. Today, direct debit is used extensively for a wide variety of payments. Accordingly, the fact that Japan is the global leader in ABMs but a follower in EFTPOS is partially because of a strong historical preference for cash in the personal sector.

In corporate banking, Japanese banks have been quick to develop EDI to facilitate just-in-time management. Interbank payment options are highly automated in Japan.[66]

Germany

Technological innovation in Germany has been driven by demands from large corporate customers and by the need for a payment medium to substitute for cheques, which were never well accepted.

Although progress has been made, several factors have inhibited innovation. Mid-sized firms have resisted the move to electronic banking because they are satisfied with the current paper-based system. Retailers have resisted the move to EFTPOS debit cards because of increased fees and loss of control. And consumers are reluctant to use credit and debit cards because of transaction fees.[67]

France

France's global leadership in nationwide electronic banking systems, including EFTPOS, EDI, home banking, and smart cards, has been facilitated by strong government support and funding for new technologies.[68]

In addition, the high degree of concentration in the French banking sector simplifies interbank standards and networks. Overlapping competition and cooperation drive the need to innovate while further enabling interbank standards and networks. Of the top 500 commercial and savings banks in Europe, 74 are in France. In 1990, the total assets of these 74 was U.S.$1 831 081 063 000, of which the top five banks held U.S.$1 150 743 143 000.[69] This exemplifies the high degree of concentration existing in France.

United Kingdom

Two important changes in recent years have imposed a higher level of competitive pressure on the banks in the United Kingdom. The first change was the reorganization of the payment-clearing system in 1985, which opened up membership to nonbank financial institutions. The second change was

enactment of the *Building Societies Act* in 1986, part of the so-called Big Bang that, among other things, gave societies the freedom to provide a wider range of financial services.

For the most part, increased competition has driven financial institutions to be more technologically innovative. An exception is the abandonment of the national EFTPOS network, apparently owing to the historical habit of using cash or cheques.

Despite the increased pressure to change, the United Kingdom remains a heavily cash-dependent economy, with only 72 per cent of the adult population having some form of transaction account (which includes credit cards).[70]

United States

The *Pepper-McFadden Act* of 1927 severely restricted interstate bank branching and constrained the growth of nationwide banks in the United States. The resulting fragmentation has made it difficult to achieve the economies of scale necessary for large information systems, has held back the establishment of national standards, and has complicated the development of nationwide interbank networks.

Although interstate banking restrictions have impeded the implementation of technological innovation, they have also driven the development of the largest credit card-based financial institutions, Citicorp and American Express. These companies have also become the leading users of image processing as a means of reducing costs and improving service. Moreover, if large multistate bank holding companies do emerge in the United States as a response to interstate branching prohibition, then this move could provide added impetus for the increasing use of electronic banking. However, despite lack of scale, the U.S. environment has spawned significant innovation in general.[71]

With roughly 12 000 individual banks in the United States — this number is a consequence of the interstate restrictions — there has been tremendous scope for technical and service innovations of every description. Many of these have been driven by attempts to cope with the inefficiencies of such a fragmented banking system. Although most U.S. banks are too small to support internal R&D efforts, several are large enough to take on even the most ambitious development projects. And the massive number of small institutions has created a huge market for bank consulting services, which are consequently better developed than those in any other country. There is virtually no idea in banking that is not tried first in the United States.

However, the U.S. banking system has recently been hit with a different problem: the savings and loan ("S&L") controversy. Latest figures suggest between $200 billion and $400 billion will have to be committed by U.S. federal authorities to preserve the accounts of depositors at several hundred S&Ls, particularly in the southern and southwestern United States.

This is a good illustration of the problem of banking fragmentation. The economy of the United States, like that of Canada or any other large country, has significant regional variation. If, for example, petroleum or raw-material commodities are undergoing price increases, this typically implies higher costs and lower profits for manufacturers, who may be hundreds of miles away. Local property valuations are likely to reflect these differences: rural mining areas will show gains in real estate prices, whereas downtown urban centres will show a softening of property values.

The U.S. S&L crisis came about owing to both the regulated lines of businesses in which they were permitted to be and the geographic dispersion of the S&L units, that is, each existed within its own state only. Responding to promising economic conditions in the south and southwest United States during the 1970s and 1980s, local S&Ls advanced loans for property development in those regions. Higher real interest rates and diminishing returns to economic activity in those regions in the late 1980s made many of the S&Ls virtually insolvent. Their role was to carry property mortgages,

and they were limited to a particular region. Inevitably, changes in the local economy hit them disproportionately hard.

Accordingly, it can be seen that generalizations about technology levels in the U.S. banking system are difficult to make. Large U.S. banks in demanding markets (for example, New York City with its heavy concentration of both major corporation headquarters and investment dealers) are probably world class in technology usage and development, but small units in less-advantaged regions are probably behind the technological state of the art. The weakness of the U.S. banking system is therefore not related to a lack of innovative ideas. On the contrary, it is because of the lack of adequate diversification of the loan portfolios of U.S. banks as a consequence of their restriction within state boundaries.

There is now an emerging trend toward mergers in the U.S. banking system. At least two major mergers were announced in early 1991. The new units will be among the top 10 largest U.S. banks. It is forceful evidence that the U.S. banking sector is appreciating the significance of economies of scale. In states with relatively large populations, such as New York, California, Illinois, and Pennsylvania, it is likely that substantial economies of scale can be developed. Less-populated states will still have a problem, unless there are changes to the U.S. banking laws.

Canada

While Japan is the leader in automated banking machines, Canada's investment in ABMs is comparable to that of other developed countries.

EDI is not well established in Canada, but the banks are in the process of establishing an EDI network to serve the Canadian business community. Moreover, information services in general remain a promising area of business to Canadian banks, once deregulation proposals are implemented.

Canada lags far behind most other countries in EFTPOS primarily because of a lack of acceptance by large retailers, although trials are now taking place. Smart cards and home banking are still at the trial stage.

Supported by strong domestic computer and telecommunications suppliers, however, the Canadian banking sector has a strong track record in technological innovation, most notably in shared nationwide banking networks.

Canadian financial institutions have built their success by cooperating on shared networks to build the critical mass necessary to support these networks and then competing aggressively by attempting to differentiate themselves with proprietary products and better service. The two most notable examples of this cooperation in building shared networks are the Canadian Payments Association and Interac.

The federally regulated Canadian Payments Association includes Canadian financial institutions and the Bank of Canada. It operates a national cheque-clearing and -settlement system and is planning a national payment system. As of 31 May 1988, the association's member institutions accounted for 95 per cent of the transferable deposit liabilities of all Canadian deposit-taking institutions.[72]

Largely as a result of the Canadian Payments Association, Canada's national clearing and settlement system is, in the eyes of many observers, one of the most effective and efficient paper-based systems in the world. As in Japan and the United Kingdom, the Canadian technology is strongly adapted to old habits — Canadians use cheques.

Interac was established in November 1984 by several leading members of the Canadian Payments Association to create a national, shared ABM network linking the proprietary ABM systems of different financial institutions.

An indication of the success of Interac is the rapid increase in ABM usage, from $4 million in cash withdrawals through network interchanges in 1984 to $34 million in 1987 to an annual rate of $52 million in the early months of 1988.[73]

Overall, Canadian banks make very effective use of technology in their current service lines. While there may be selected technologies — like EFTPOS and home banking — in which foreign industries are more advanced, for meeting the demands of its clients, Canadian banks seem well up to global technology standards, given existing service lines. Several new technologies, like EFTPOS and home banking, have really not given the Canadian customer enough extra value to encourage wide use. As in the telecommunications sector, the issue seems less to be Canadian R&D for new technology than it is the regulatory environment. Canadian banks have the technology to provide more lines of business, but they are not currently permitted to do so.

Technology Strategies and R&D Performance in the Canadian Banking Sector

In general, Canadian financial institutions tend to buy hardware and software and then adapt the systems for their use. The larger banks and trust companies have extensive in-house systems-development groups whose primary function is to develop banking applications that function on software and hardware platforms developed by external suppliers.

The Royal Bank, for example, has an in-house systems-development staff of approximately 1400 people, has invested $2 billion over the past five years on systems development and acquisition, and plans to spend another $2 billion over the next three years.[74] It is a technology adapter and applications innovator. The smaller Toronto-Dominion Bank employs about 550 people in its management information system group, which accounts for 15 to 20 per cent of the bank's non-interest expense.[75] It is also a technology adapter, but it could be described more as a close follower of applications innovation.

A point of contention with the banking community is that little, if any, of the work done by their systems-development staff qualifies for R&D tax credits. Most of what the government considers R&D for the banking sector is performed by software and hardware suppliers, of which IBM is the largest.

R&D and Technology Investments

Canadian banks consider that they are doing R&D, albeit of a rather specialized adopt and adapt nature. However, the federal government and the banks do not appear to be fully in accord on what constitutes R&D for tax purposes, and it is believed that Revenue Canada accepts only limited R&D claims from the banking sector for tax-credit purposes. Tax returns are, of course, confidential, and some caution must be used in suggesting exactly what are the real banking R&D levels in Canada.

While they often wrestle with the make-or-buy decision on technology, the large banks and trust companies are unlikely to find suitable off-the-shelf packages to fit their needs because of the complexity of their operations. The Toronto-Dominion Bank, for instance, recently conducted a worldwide search for a mortgage processing system, but the best system it could find could handle just 52 per cent of the bank's requirements.[76]

Smaller financial institutions, which have relatively simple system requirements, are often able to purchase off-the-shelf applications that have been developed by software vendors. However, some smaller credit unions have actually developed some innovative banking systems, often in conjunction with systems vendors.

Under these circumstances, with differences in the definition of R&D between countries and even between firms, it is impossible to make direct comparisons of Canadian and foreign banking-sector R&D expenditures. No Canadian bank appears to have a formal R&D department, although all of them have systems-development units in one form or another. The comparative state of Canadian banking technology has to be inferred from other indicators, such as investment in computer hardware and software, or the age and technology generation of electronic business equipment, or total telecommunications investments and expenses.

Table 3 shows there has been rapid growth in computer hardware and software purchases by Canadian banks.

Table 3. Total hardware and software investments by Canadian banks (1983-1990)

	1983	1984	1985	1986	1987	1988	1989	1990
Within Canada	301.5	312.3	341.6	377.5	388.2	481.1	561.5	660.9
Outside Canada	21.4	27.4	53.3	79.5	84.6	88.1	88.6	104.1
Total	322.9	339.7	394.9	457.1	472.8	569.2	650.1	765.0

Source: Canadian Bankers Association, personal communication, 1991.

To remain competitive, the whole Canadian financial sector has invested heavily in technology. Total capital spending on machinery and equipment by the financial sector in Canada between 1983 and 1989 increased by an average of 17 per cent a year — more than double the 7.6 per cent average in the previous 1975-1982 period.[77] While these figures need to be viewed with caution, owing to differences among banks as to precisely what is included, nevertheless the Canadian banking-sector's investments in information technology do seem sizable.

The rapid growth in investment in new technology by Canadian financial institutions reflects a worldwide trend. The demand of the world's financial institutions for computing power is growing at more than 40 per cent a year and is currently estimated at more than $30 billion. This is a phenomenal increase (although computer power is declining in unit costs). It is estimated that U.S. commercial banks alone spent $9.5 billion on information technology in 1986 and $12.5 billion in 1989.[78]

These estimates would imply that the U.S. banking sector was investing relatively more than its Canadian counterpart, but by only a small margin when the relative sizes of the two economies are taken into account. Given a 12:1 ratio in the size of the U.S. economy compared with that of Canada's, then relative to the estimated 1989 U.S. investment of $12.5 billion the Canadian figure should have been $1 billion. In fact, it was $650 million, although this rose steeply to $765 million the next year. Thus, the Canadian banking sector appears to invest in technology at about two-thirds to three-quarters the rate of its U.S. competitor. However, this comparison leaves out a large number of variables — for example, balance of personal versus corporate banking, level of international activities, specific lines of business, and exact details of suppliers' capabilities. Nevertheless, it seems fair to say that Canadian banks believe they are making a more than adequate investment in technology. This judgement is supported, at least in comparison with U.S. banks, by the Canadian banks' much larger relative size and ability to capitalize on economies of scale. Not being geographically limited, as U.S. banks have been, their large networks and cooperative systems mean they can avoid duplication of effort. This could explain the relatively lower investments in Canada.

Not only is the investment in technology growing, but the nature of that investment is changing from one that was cost driven to one that is now much more service driven, moving from large, centralized batch processing to distributed on-line processing and automated customer access at the branch level.

The evolution has been driven by advances in the converging technologies of computers and telecommunications. This convergence has enabled the development of on-line distributed processing systems and led to a host of new banking services. Facilitating this rapid introduction of new technologies in the Canadian banking sector has been the strong domestic infrastructure of computer and telecommunications suppliers.

Large Schedule I Banks and Trust Companies

Increased competition by foreign banks and other financial institutions in the corporate lending field has driven the large domestic banks and trust companies to refocus their strategies at the retail banking segment. Increasingly, electronic networks are seen as the key to enhancing their bricks-and-mortar branch network to deliver improved service and more sophisticated products at a lower cost.

The large banks and trust companies are among world leaders in the use of technology. They have the financial resources to develop and operate large electronic networks, and they benefit from significant economies of scale because of the extensive retail network.

However, the range of products and services offered by Canadian banks inevitably tend to be similar as a result of the usual adopt and adapt technology strategy. In fact, their current product lines are practically indistinguishable.

Schedule II Banks

The subsidiaries of foreign banks may thrive with their focus on specialized product and market niches. Because of the high barriers to entry posed by the large branch networks of banks, these subsidiaries have concentrated on serving specialized niches, such as ethnic groups, wealthy individuals, and real-estate markets.

Although unable to compete head to head with large banks and trust companies, the small banks have overcome some of their disadvantage of limited branch networks through access to Interac. Also, the focus on specialized niches largely eliminates the requirement for expensive multibranch electronic networks that customers tend to expect from larger institutions. Technology transfer from parent banks compensates for lack of economies of scale.

Lastly, the Schedule II banks may be able to identify, and develop supporting linkages with, Canadian firms who have stronger than average growth potential. Specialization could be a useful asset.

Regional Financial Institutions

These mid-sized, multibranch trust companies, credit unions, and caisses populaires are in a difficult position because they tend to be in direct competition with large national financial institutions that benefit from significant economies of scale and extensive multibranch networks. Because these mid-sized institutions have more moderate financial resources and cannot benefit from significant economies of scale, they do not have many specialized systems-development staff. Moreover, they cannot realistically participate in the global corporate-financing market.

On the other hand, the smaller network requirements of the regional financial institutions can often be met by external system suppliers who are able to spread their systems-development costs over several customers, which, in essence, allows the regional institutions to gain some economies of scale.

Access to the shared ABM network is another advantage in meeting customer demands for convenience, but a cost premium and a potential loss of customer loyalty are associated with use of a competitor's ABMs.

The regional financial institutions that continue to thrive will likely be those that are best able to capitalize on personal service and strong local loyalties while making the best use of available technology from suppliers.

Small Credit Unions and Trust Companies

These stand-alone trust companies and credit unions have limited financial resources, distribution networks, and networking capability. They maintain the loyalty of local clients through superior service and historical roots.

These institutions were often the first to adopt new technologies in the past. Credit Union Central in Saskatchewan, for example, developed the first customer-information teller terminals in the 1960s, well ahead of the banks.

The undoing of the credit-union system was its method of cost sharing: costs were allocated to individual credit unions according to membership, with no regard to economies of scale. As a result, larger credit unions ended up heavily subsidizing the small ones, so eventually they began developing their own systems.

The fragmented, stand-alone banking system used by the credit unions for the most part is not suitable for interbranch networking. The credit unions in Saskatchewan and the caisses populaires in Quebec use one province-wide system, but they are the exception. The latter could conceivably be emulated by the others, however.

In 1987, the Canadian Co-operative Credit Society formed a committee of CEOs from the provincial central and national financial organizations. The committee identified the declining competitiveness of the system as a threat to survival. It struck a national Service and Product Development Committee. In 1989, that committee produced a preliminary strategy aimed at achieving economies of scale in development and marketing, eliminating or at least constraining duplications, and opening a path for further cooperation at the national level. Although steps have been taken, there are doubts about the commitment to the strategy in some provinces.[79]

Technology in the Future Evolution of the Global Banking Sector

The evolution of the global banking sector may raise a new technology-related issue: firms, especially industrial ones, that make good use of technology and can look forward to real growth and continued or enhanced profitability will be considered more creditworthy. If technology becomes a more important factor in the long run in the global economy, then it would be in the interests of Canadian banks to be able to evaluate the technological competitiveness of their clients to determine whether they are creditworthy. Are Canadian banks fully considering this issue?

There is an interesting debate under way in the Canadian banking sector on the implications of future global technological development. But at the present, the sector has not, in general, equipped itself with the skills and capabilities required to analyse future industrial and commercial technology directions. This is the aspect of technology that most separates Canadian banks from their Japanese (and to a lesser extent, U.S. and European) counterparts.

There is a possible corollary to this question of assessing the technological capabilities of corporate clients. Can banks, or should banks, act to enhance their clients' technological fitness and thus improve their creditworthiness?

To this question bankers would reply that the technology strategy of a business client is the affair of that client's management. Bankers would say that they must take care not to dictate management decisions, either directly or indirectly through subtle pressure, lest the borrower subsequently blame any business failure on decisions taken in response to pressure from his or her banker. Court decisions have already established that the existence of such pressure can invalidate the bank's entitlement to its loan security. Obviously, bankers will take into account their assessment of the technological fitness of a borrowing company as part of the credit-granting decision. But they would say that any subsequent active involvement in what are seen as management prerogatives would be inappropriate and risky.

However, Canadian bankers still face some problems in assessing technology impacts. The well-known structure of the Canadian economy, with its relatively heavy orientation toward services and raw-material extraction and processing, limits the opportunities Canadian banks have to gather first-hand experience with the financing needs of large, technology-based, high-growth companies. The kind of large, indigenous multinational firm prevalent in foreign sectors, such as Japanese electronics, American aerospace, or European pharmaceuticals, generally does not exist in Canada. Accordingly, Canadian banks, operating primarily or solely in the Canadian market, suffer inevitable limitations.

Yet, the evolution of the global economy from a technological perspective and the developing response from other nations' banking sectors raise numerous important questions for Canadian banks and their relationship with technology generally.

Future Growth of the Canadian Banking Sector

In recent years, the growth of Canadian bank assets in current dollars has been 8.6 per cent annually — very similar to, and consistent with, the growth in current dollars of the Canadian economy overall. (Allowing for inflation averaging 5.3 per cent annually, the real growth of assets would be in the range of 3.0 to 3.5 per cent per annum.) The specialized financial services of trust companies have grown somewhat more rapidly, reflecting their concentration on sectors of the economy (for example, real estate) that have outpaced the overall economy. Can Canadian banks improve their growth potential?

Consumer loans are not likely to grow much faster than the overall economy, and thus, the personal banking market probably cannot lead to higher growth. Personal disposable income per capita has shown only limited growth in the last 20 years. Consumer debt ratios even increased slightly during the 1980s. Typically, automobile loans, for example, are being financed over longer terms. Moreover, in the United States, nonbank issuers of credit cards (for example, the long-distance telephone company, AT&T) are now making this market more competitive, putting downward pressure on interest rates and limiting banks' opportunities for profits in this loan area. In sum, asset growth through consumer loans is not likely to outperform the general economy.

The unincorporated- and small-business market is more promising for growth than the personal loan market but is still limited. In the last 20 years, more jobs have been created in Canada in the small-business and unincorporated-business segments than in larger units. Accordingly, this sector could represent a growth market for banks' assets. However, there are limits to how large these firms can grow and how profitable they can become. In the case of unincorporated businesses, at least, successful firms will incorporate eventually to obtain more favourable tax treatment. Anecdotal evidence, however, suggests that some Canadian banks are targeting the unincorporated- and small-business segments as a promising market.[80]

For two reasons, corporate financing of medium-sized and large firms appears to represent the strongest growth market.

First, such corporations participate disproportionately in world trade, owing to the high investment costs for global marketing and distribution that only large firms can support. Second, there is an emerging global market for the financing of the controlling interests in such corporations — so-called merchant banking. Both these factors imply that banks whose financing services are targeted on growth corporations — which, as we shall see, are likely to be technology intensive — may well see their assets grow more rapidly than the global economy overall.

Other markets for Canadian banks' services do, of course, exist. Such markets include carrying government debt and financing real estate. But at least within Canada both of these markets seem relatively limited. Governments in Canada are now generally trying to restrain their deficits. Demographic variables, such as an aging population, suggest that residential property development may slow down relative to the overall economy in the future. (Foreign real estate, such as recreational properties, may be a high-growth market, however.) Commercial real estate may represent a growth market, but like the unincorporated- and small-business segments, commercial real estate is likely to parallel the growth of the overall economy — not outpace it. A great many variables affect different markets' growth, but on balance, selective corporate financing still seems to offer the best prospects for outpacing the economy overall.[81]

Global Banking Changes: The Restructuring of Corporate Financing

An entirely new phenomenon is emerging in the global banking sector: banks' participation in the restructuring of corporate financing. This is a controversial topic. But it may turn out to be the vital issue in banking. The evolution of the banking sector globally is likely to be strongly linked to the development of responses to this growth opportunity.

Until the mid-1970s, virtually no bank in the world would lend money so that clients could buy securities, for example, the common shares of publicly traded corporations. Stockbrokers could, and still can, arrange purchase "on margin" for their more creditworthy clients (that is, brokers would lend their better clients money with which to purchase additional securities), but this process was very carefully regulated. This careful regulation was a heritage of the disastrous stock market crash of October 1929, when there was a massive downward price movement in stocks owing to the very low

level of real equity investors had actually committed as collateral during the 1920s. Banks no longer believed they had any business supporting such gambling.

The large cash balances accumulated by the Organization of Petroleum Exporting Countries (OPEC) in the wake of the 1970s oil crisis helped to change this behaviour. The rapid run-up in oil prices led to what is commonly called an income transfer — in this case, from western consumers to OPEC governments. Banks became intermediaries for additional very large sums in a short time frame. Because oil was traded in U.S. dollars, banks operating in this currency became a preferred holding place for the money. Banks had to pay interest on these deposits; for a short period they had to go looking for would-be borrowers. Entrepreneurs who could make a convincing case that a given company's stock was fundamentally undervalued, and hence safely worth buying, began to look respectable to bankers. Also, some Arab governments, notably Kuwait's, were themselves taking direct action in the stock market to acquire long positions in private firms' shares. Such entrepreneurs and governments began to draw on bank deposits to make their investments.

Furthermore, in the United States, the continuing growth and evolution of corporate mergers and acquisitions (M&A) activity over the past two decades have set the stage for the emergence of a truly global market for corporate control. This growth of M&A activity has spawned new financing techniques. The most famous (perhaps notorious would be a better word) is the leveraged buyout (LBO) phenomenon that began in the 1980s. An expanding core of U.S. investment banks, commercial banks, M&A advisory 'boutiques', and LBO investment companies is using several new buyout techniques to expand the scale and range of business takeovers and reorganizations in the private sector.

In the process, many U.S. financial institutions are for the first time acquiring ownership and control of industrial and commercial enterprises of all kinds. As surplus-rich economies seek investment outlets for available liquidity (today this means predominantly Japanese and Far Eastern funds) and industrial sectors in Europe regroup on a large scale in anticipation of a barrier-free market in 1992, a new worldwide market for the restructuring of corporate ownership seems to be developing.

Both directly and indirectly, banks are playing a much larger role in these new, evolving financing structures than has traditionally been the case: directly, because their loans provide an increasing share of the funds required for financing corporations and also because banks could earn important fees for assisting deals; indirectly, because new, entrepreneurial intermediaries are using bank funding to acquire, merge, divest, and rationalize corporate entities. The forces that have brought about this enhanced role for banking in corporate financing show no signs of diminishing. And the force that is at the top of the list is technology.

The 1980s: Forces for Change in Financial Markets

A variety of forces in world financial markets have propelled the growth and expansion of new corporate-financing structures. At base is the urge of healthy commercial enterprises to grow. They turn to acquisition when organic growth is no longer sufficient. Troubled or vulnerable enterprises seek new sources of capital, either to buy time to recover from a momentary reversal or to restructure their businesses. Most prefer to do so independently: they themselves seek a new source of capital and ownership. Sometimes, however, they become the target of a predatory acquirer. Intermediaries search out profitable opportunities to promote matches between strong buyers and desirable sellers and facilitate the completion of a merger, acquisition, or buyout deal.

These forces have never been so obvious as in the United States during the 1980s. The scope, scale, and frequency of changes in financial structures that amounted to effective corporate control grew rapidly throughout the decade. There seems little reason, in principle, why it should slow down.

As the world economy has grown and the channels between economies have opened — enabling ever greater flows of funds, trade, and investment — the field on which transfers of corporate control can take place has expanded. Despite the difficult 1990-1991 global recession, these underlying forces will likely return and intensify. These forces include:

- *Banking technology* — Above all, it is technology that allows the accumulation, mobilization, and disposition of large capital pools. Technology then can move the money (in reality electronic credits) physically to the purchase point in less than a second or two. Folklore in the banking sector has it that at any given moment, 100 times the money required as liquidity to finance world trade is being electronically moved internationally for purposes of capital purchase or speculation. It is technology that allows, and then drives, this market. Of course, a major investment is not initiated, structured, and implemented so fast. But it is largely thanks to information and communications technologies that banks can now participate in such international activities.

- *Globalization of financial markets* — The past two decades have seen a phenomenal increase in the scope, volume, and rapidity of funds transfer or investment across national boundaries. For investors today, transferring funds from Toronto to Tokyo is as simple as completing a payment within Toronto. Similarly, an investor in New York can learn as much — and as quickly — about an investment opportunity in Frankfurt as about a local one. In financial institutions and corporate trading rooms worldwide, thousands of traders have access to the prices for an ever-broadening array of capital and money-market instruments in real time. Globally, technology is making financial markets more efficient, and investors thus need to make, monitor, and manage investments of all kinds in an increasingly unified and global market framework.

- *Deregulation* — Continuing deregulation of financial markets in North America, Europe, and Asia is ongoing. The most visible and lasting impacts, however, have been the opening of domestic financial markets to foreign competitors and the gradual, persistent loosening of the constraints that preclude commercial banks in North America, Japan, and the United Kingdom from participation in corporate securities markets. As the barriers to foreign competition continue to erode, banks, securities firms, and institutional investors of all kinds have gained ever-widening access to capital and money markets in every major economy. Just as securities firms have increased their profit opportunities through expanding securities trading, corporate-finance intermediation, and securities-centred deal making, so are many commercial banks beginning to use every available means to extend their activities into the corporate securities markets.

- *Opportunities to escape the tyranny of short-term performance demands* — In the 1980s, North American institutional money managers put pressure on the management of publicly traded companies to produce earnings growth on a short-term, quarter-to-quarter basis. Managers became preoccupied with the short term and allocated scarce resources only to short-term objectives. In some cases, this focus crippled managers' ability to think seriously about — and, more important, to invest in — the long-term survival and success of their enterprises. As they increasingly faced global competitors who were relatively free of such short-term constraints, especially the Japanese, some managers looked for or became receptive to proposals that would relieve them of public market pressures by restructuring the company through private financing. Banks could give them access to financing on the scale they required.

All these forces are leading to a common conclusion: a general levelling and a convergence of competition among financial institutions are occurring globally. An inevitable corollary is the development of a globalized market for corporate control. Such corporate control is merchant banking.

Emergence of Merchant Banking in Europe and the United States

In Europe, merchant banking is an old tradition. Banks in the United Kingdom, France, Germany, Switzerland, and the smaller European countries shared many such characteristics. The common thread binding most of these banking houses is that they either have held ownership positions in their industrial clients or share ownership positions with their clients or other investors in a broad variety of industrial and commercial enterprises. These banks develop close, exclusive, and semipermanent relationships with a cluster of commercial enterprises. (In Europe the expression universal banking is used to refer to still more broadly based institutions that encompass outright securities dealings, and even insurance.)

In the United States, by the late 1980s, because the financial intermediaries transforming the domestic market for corporate ownership were making large, new profits, a few U.S. investment banks began to label their M&A and LBO activities merchant banking. However, this term is still very imprecise in a North American context. Nevertheless, because the term can readily embrace the full range of financing, advisory, and other functions surrounding these change-of-corporate-control transactions, some large U.S. commercial banks and other financing intermediaries have been using the merchant banking label. Although no major U.S. financial institution has yet to redefine itself as a merchant bank, the term is coming increasingly into use to describe the ownership function as well as the financing and other advisory activities surrounding the market for corporate control.

A case in point may be J.P. Morgan and Company. While other major U.S. banks, notably Citicorp, seemed to be retrenching in 1991, Morgan was expanding both its overseas and U.S. operations. For example, in May 1991, Morgan underwrote the first bond offering for a private Latin American company since 1982.

As a recent article in *BusinessWeek* says, "Morgan's current success, however, is the product not of a mere revitalization but of a complete remaking, even redefinition, of the institution. Morgan has transformed itself from a conventional commercial bank into a European-style universal bank, combining commercial and investment banking and trading functions. Analysts now view Morgan as one of a handful of firms that will dominate global finance in the 1990s."[82]

The profits and fees from this sort of activity are significant. In 1988, buyers spent more than $260 billion on M&A transactions. The financial advisers and intermediaries who originated the deals, advised the principals, or structured the financing for M&A and LBO deals that were completed in 1988 earned several billion dollars' profit. Moreover, fee income from arranging the deals represents another source of profit to banks. An example is KKR's buyout of RJR Nabisco Co. — the largest LBO transaction to date. For less than six months' work, this single $25 billion transaction produced some $350 million to $400 million in fee income for a dozen or so investment and commercial banks for advising on the transaction and for arranging the financing necessary to fund the deal.

The growth and profitability of this new form of merchant banking in the United States have made it a principal model for the changing markets for corporate control in Europe and Asia — although not yet in the regulated Canadian environment. Banks, securities firms, and other financial intermediaries in these regions are endeavouring to understand and adapt the U.S. experience to their own markets, as well as to rapidly expand cross-border M&A opportunities in their own regions. This will serve to underline the emerging global nature of corporate control financing.

In the future, many merchant bankers could emerge as large multinational industrial holding companies, with diverse, global portfolios. This is going to create the possibility of a new relationship between banking and technology.

Merchant Banking — The Implications for Technology

So far, the restructuring of corporate financing in the United States has definitely not been directly concentrated on technology-intensive firms. For example, the firms involved in LBOs have ranged from airlines to food processing companies to retail stores and real estate. But the evolution of corporate-financing structures is likely not yet complete.

If technology becomes a determining factor in differentiating high-growth and/or high-profit firms from those that are less successful, and if some banks play a major part in the financing that determines the relevant corporate control, then those banks would stand to make large profits through what are essentially technology investments. Their asset growth would also likely outperform the global economy.

The implications of the growth in world trade suggest this. The technology component of world trade is increasing. In real terms, the annual growth rate of world trade (typically 6 per cent) is approximately double that of overall gross world product (3 per cent). In turn, the sales of high-technology goods' grow at a rate twice that of world trade: for example, total sales in the electronics sector have been growing at about 12 per cent annually. (See Science Council of Canada Sectoral Technology Strategy Series, No. 14: *The Canadian Electronics Sector*.) The electronics sector is made up of growth firms and industries; banks that finance them will gain market share, whereas those that do not will lose it. Accordingly, banks' technology strategies might well need to include an element of technology intelligence. This could be the requirement for determining the creditworthiness of many of their clients in the future. Certainly, banks that acquire such intelligence capabilities stand an excellent chance of outperforming those that do not.

However, the new financing techniques for corporate restructuring would have to be modified if, in the future, technology-intensive firms represent the growth opportunities for financiers. In particular, if new corporate financing structures simply carry over the tyranny of short-term performance demands unchanged, they could be damaging to many firms in terms of a technology strategy and R&D. R&D managers, however skilful, cannot command creativity. It has to be nurtured. Unfortunately such nurturing is usually compromised if timeframes available to garner results are too short. On the one hand, it is true that taking a commercial firm private (for example, through an LBO) can relieve this tyranny, and this, in turn, can actually allow enhanced R&D: examples exist of Canadian firms following this path in the automotive-parts and electronics sectors. (See Science Council of Canada Sectoral Technology Strategy Series, No. 2: *The Canadian Automotive-Parts Sector*, and No. 14: *The Canadian Electronics Sector*.) But, on the other hand, conventional wisdom has it that the R&D department is often sacrificed after an LBO to free up cash flow and pay down debt.

Indeed, following the 1980s mergers and LBOs, many analysts complained about reductions in R&D and technology investments in this environment. In general, acquisition by debt instruments like LBOs puts a premium on cash flow in the aftermath of the financing operation. In numerous well-publicized examples, the R&D departments were sacrificed to cut short-term costs. But will this be true, and must this be true, of merchant banking in the future?

Merchant Banking at its Logical Conclusion: The Japanese *Keiretsu*

All the above forces favouring merchant banking are taken to their logical conclusion in the Japanese *keiretsu* or corporate family.[83]

A *keiretsu* is an agglomeration of firms built around a core bank that provides financing and management assistance. Moreover, the *keiretsu* is both vertically and horizontally integrated. For example, it will likely include a major manufacturing company, such as a consumer electronics producer; this company, in turn, would have a vertically integrated series of component and subassembly supplies. As well it would have horizontal linkages to, for example, a food and beverage company, a metals, plastics, or other refined-material supplier, and a major trading company to provide both export marketing presence and top bargaining power for any necessary imports (like raw materials). All would share market intelligence, concessionary financing, and overall corporate direction. The Mitsui group, for example, includes companies in fibre and textiles, foodstuffs, construction, retailing, finance and insurance, chemicals, pulp and paper, mining, steel and metals, transportation and warehousing, machinery, automobiles, and so on. Farther afield are dozens of other companies more loosely affiliated with the group.

Each modern group, or *keiretsu*, has at its core a commercial bank and usually one or two other firms including a trading house. The commercial bank in each group now plays, in an informal sense, a central coordinating role.

Although formal holding companies no longer own the controlling shares of *keiretsu* members, financial control remains closely held within the 'family'. Firms affiliated with a group may borrow widely, but their main bank relationship is always with the bank at the group's core. Both the bank and other firms within each group also own shares of the other member firms. Shareholdings by any one firm seldom exceed 2 to 3 per cent of the total shares of other member firms; yet, adding all of the bits and pieces shows effective control of each member company is held invariably by so-called stable shareholders within the same group.

The members of each group also conduct the bulk of their business activity within the group. They procure their supplies and materials where possible from other members of the group; and they market their products through the group's trading company. It is estimated that as much as 50 per cent of the business transactions conducted by group members is with other affiliates of the same group.

Most important, the *keiretsu* coordinates planning and strategy formulation among its member firms. Although the firms span a wide range of industries, and each is ostensibly owned and managed independently, ongoing communication and coordination occur at all levels. In particular, the CEOs of the companies near the centre of each group meet periodically to discuss matters of common concern and to coordinate their business strategies.

In the case of Mitsui, for example, the presidents of the 25 or so most strategically important firms meet every second Thursday (hence the group is referred to as Nimoku-kai, or the Second-Thursday Group).

It is difficult to overemphasize the importance of these meetings at which the CEOs discuss candidly such topics as new product developments, competitive strategies, and government policies. They may decide to provide subtle but powerful assistance to member companies that are launching new products, entering new markets, or are otherwise in strategically sensitive positions. Assume, for example, a member of the Mitsui group such as Toyota is attempting new market penetrations abroad, the success of which is felt to be strategically important to the entire group. In such a case the group's bank will make funds more easily and cheaply available to that firm, compensating by raising slightly the cost of capital to the other members of the group. In essence, the entire group subsidizes the cost of capital to those firms of particular strategic importance at any moment of time. Other member firms

may assist by lending managerial or technical personnel or by stretching their intercompany accounts to a year or more to provide additional liquidity.

The classic illustration of the vertically integrated segments of a *keiretsu* is the Japanese automobile industry. Each major automotive assembler has a hierarchial underpinning of 'family' companies. Each level or tier in the hierarchy is responsible for a certain amount of technological upgrading from raw materials to components to subassemblies right up to final vehicle assembly. There are both formal and informal upward and downward relationships. The most important are informal: the assembler makes an unspoken commitment to continue to buy components from the parts supplier, and the parts supplier will ensure the staff all know what make of car to buy. (See Science Council of Canada Sectoral Technology Series, No. 2: *The Canadian Automotive-Parts Sector* and No. 4: *The Canadian Automotive-Vehicle Sector*).

But even more important, this whole automotive hierarchy is linked to one particular bank. Precisely the same informal, but vital, relationships apply.

A brief case study illustrates some of the major implications of this. In 1974 one Japanese automotive assembler, Mazda, got into financial difficulties. Mazda had first licensed, and subsequently, further developed a major innovation, the Wankel rotary engine. Unfortunately, in 1974, at a time of oil supply disruption and rapidly rising gasoline prices, the Wankel engine was relatively fuel inefficient, causing a major slump in Mazda's sales, particularly in the United States.

At that time Mazda was not a major global producer — certainly nothing like the large firm it is now. Nonetheless, the relevant bank in the *keiretsu* to which Mazda belonged at the time did indeed ensure the financing was raised to carry Mazda through the crisis. The bank did so because it recognized the long-run potential of the novel Mazda technology.

The relationship can also be supportive in the other direction. Recently, Toyota Motors provided cash reserves to its bank in order to bolster liquidity — an unusual example of a client lending money to the bank rather than the other way around. Toyota had no difficulty in doing this, because more of its profits nowadays come from investments than from manufacturing.[84]

The *keiretsu* structure is a profound feature of Japanese industry. The tiering concept allows the integration of new technology from both innovative small firms and the laboratories of major multinationals. This integration has allowed the Japanese automotive and electronics industries to become, literally, world dominant. Backed up by global trading networks and financed at the centre by a major bank, these industries are formidable industrial competitors. But, as identified in several Science Council of Canada Sectoral Technology Series studies (see, for example, No. 2: *The Canadian Automotive-Parts Sector*; No. 3: *The Canadian Iron and Steel Sector*; No. 4: *The Canadian Automotive-Vehicle Sector*; No. 6: *The Canadian Petrochemicals and Resins Sector*; No. 8: *The Canadian Nonferrous-Metals Sector*; No. 10: *The Canadian Machinery Sector*; and No. 14: *The Canadian Electronics Sector*), it is technology that drives these industries, both in process manufacturing and new-product development.

Analysts, particularly in the United States, note that the Japanese banks do not make year-to-year profits commensurate with the large size of their asset base. Such a conclusion seems misplaced. The role of the banks in Japan is primarily to ensure their industrial clients make money. In the long run, their clients' profits ensure their own solvency and long-term stability.

According to a recent *Fortune* article, the *keiretsu* is a new form of capitalism based on industry alliances.[85] It ensures a 'total-system capability' from raw materials to finished products, including all the intermediate steps in manufacturing and supported by global services in marketing and financing. It has allowed and driven the development of the so-called lean enterprise typified by the Japanese automotive and electronics industries. No doubt some critics can find drawbacks to Japanese social structures, labour practices, and business habits. But the point is that, whatever

reservations from a social standpoint one may have in analysing the results of the *keiretsu*, it is still a formidable industrial organization. And in the Japanese example, technology has been a major factor in the success of banks and their clients.

The Implications for Future Canadian Banking Developments

There is virtually nothing in Canada to equal the *keiretsu* structure, certainly nothing that incorporates the high-technology, multinational enterprises Japan has grown. Moreover, it seems fair to say that the merchant-banking role is very limited for Canadian banks.

It is questionable that Canadian banks have at present the market intelligence and technology-forecasting capability to allow their top executives the kind of management role for overall corporate direction that is exercised by their Japanese counterparts. A major reason for this is because Canada lacks the type of domestically based firms that compete in major technological systems (for example, aerospace, electronics, automotive vehicles, and chemicals); hence, Canadian banks operating within the Canadian economy simply do not have the opportunities to evaluate more complete industrial structures. Finally, in the regulated Canadian environment there has been much less attention paid by banks to the opportunities for new forms of corporate structuring.

Even though it may be impractical to adopt the Japanese *keiretsu* structure in Canada in its entirety (owing to legal, cultural, and social differences), how can the Canadian banking sector respond to the challenges posed by this formidable industrial structure?

The challenge to Canadian banks seem to be to seek out possibilities for creating such industrial linkages and alliances and enhance their own long-term prospects for profitable financing. Unfortunately, there is no definitive study on the full implications of such structures for Canada. Undoubtedly these structures would have to be tailored to Canadian needs. Moreover, if the Japanese model does turn out to be the relevant example for long-term industrial profitability, then technology will indeed be a determining factor. In turn, this suggests intelligence services and financial databases would need to have an enhanced international focus and technology content.

At present it seems fair to say that the Canadian banking sector is not convinced of the value of a *keiretsu* structure for Canada, or even a merchant-banking role in the manner set out above.

The usual objection to a *keiretsu* structure in Canada is excessive corporate concentration. In a global trading environment, however, such objections may be misplaced. The intense global competition in a large number of industrial sectors is overwhelming evidence that the Canadian sector must be judged on global standards. (See, for example, Science Council of Canada Sectoral Technology Strategy Series, No. 1: *The Canadian Telecommunications Sector*, No. 3: *The Canadian Iron and Steel Sector*, No. 4: *The Canadian Automotive-Vehicle Sector*, No. 6: *The Canadian Petrochemicals and Resins Sector*, No. 8: *The Canadian Nonferrous-Metals Sector*, No. 10: *The Canadian Machinery Sector*, No. 11: *The Canadian Food and Beverage Sector*, No. 12: *The Canadian Electric-Power Sector*, and No. 14: *The Canadian Electronics Sector*.) All these sectors provide evidence that the relevant level of competition is global. Canadian firms need to be big enough to support necessary investments, for example, to attain a global marketing capability.

Finally, an objection to Canadian banks playing a central financing role in a *keiretsu* structure is that it has not yet proven profitable for banks outside Japan to do so. For example, evidence is available that European banks filling a merchant-banker role have not been more profitable than any others in the region.[86] It must be agreed that definitive evidence on this issue is indeed not yet available outside Japan, and even in the Japanese case there may well have to be reservations.

For example, the growth of Japanese banks' assets may be linked to Tokyo property prices — if the latter turn out to be unrealistically high, some Japanese banks may suffer serious losses.

Moreover the Japanese stock market has not always only risen. Even in Tokyo, stock prices can fall. Owing precisely to the *keiretsu* structure, of course, such falls have an immediate negative impact on Japanese banks. But the full implications of such activities need to be debated in Canada, not necessarily from the standpoint of Canada's technological development overall, but even from the more limited standpoint of Canadian banks' own development and growth of assets.

There is some evidence that such a debate is emerging. At the moment it seems to be centred on the questions of economies of scale and level of competition in the Canadian banking sector. Economies of scale in the Canadian banking sector have become an issue in recent months. Deregulation has been proposed to enhance competition. Indeed, on balance, the evidence from other jurisdictions and from other commercial sectors such as telecommunications and air travel is that, at least initially, deregulation does enhance competition. However, at least one Canadian industry spokesperson has suggested that rationalization to reduce the number of financial-services companies would be an appropriate response to deregulation and emerging global trading opportunities.[87] There appears to be at least some qualified support for this position from other industry observers.[88] The arguments favouring larger banking units include:

- a larger asset base to support stronger industrial linkages;
- more competitive access to financing markets;
- better opportunities to develop and use information technology; and
- enough resources to support global networks of branches.

On the evidence and future projections presented here, there appears to be merit in such Canadian rationalization. All the above factors support rationalization — in a global marketplace. The latter point is crucial; the objections of corporate concentration would be difficult to resist if Canada were not competing around the globe.

Another critical consideration, moreover, is to ensure that any rationalized Canadian banking structure is able to play a global role in new financing developments, such as corporate-control financing, if it turns out that such new developments become vital features separating profitable banks from less successful ones. Eventually, Canadian banks should develop the capability to prospect, imitate, structure, and finance explicit deals linking technology-based growth firms with such customers as resource companies, retail-wholesale trade companies, service-sector firms, and manufacturers.

Evaluation of Strategies

Because the large Canadian banks and trust companies make a competitive level of investment compared with their global rivals, have strong in-house technological capabilities, and can benefit from economies of scale, their technology strategies are viable so far as their existing product lines remain. The large banks and trust companies have developed world-class systems, and their network of branch banks is among the best in the world.

However, one problem is that the existing service lines of Canadian banks might not be adequate. Corporate-control financing could be much more important in the future. This requires both new technology in banking (for example, more internationally focused databases) and a new understanding of the role of technology in the global marketplace.

The Schedule II foreign banks may be able to survive, with their focus on specialized product and market niches and their ability to tap into their parent companies' resources, such as global market intelligence and technology forecasting. They may even be able to enhance their profitability through sophisticated specialization.

The technology strategies of regional financial institutions, although viable, will be under increasing pressure. Their personal networks are sustainable only when they are integrated with standardized technology.

The technology strategies of many small, local trust companies and credit unions are not viable. Their historical competitive advantage gained through innovation and personal service is being eroded, and they lack the economies of scale and resources to develop and maintain extensive computer networks and electronic information systems. The lack of common standards and shared networks is crippling the credit-union system.

Rationalization reduced the number of Canadian credit unions by 15 per cent between 1985 and 1989, even though total assets grew by 42 per cent. For them to survive, it is likely this rationalization will have to continue. Philosophically, the credit union movement has opposed the march toward centralized, multibranch systems, but market forces are driving it in that direction.

Government Policies

The government is in a position to influence the pace of technological innovation in the Canadian banking sector through its regulatory role, industrial support, and information programs. Unlike the French, U.K., and U.S. governments, the Canadian government has not played a large, direct role through government procurement or promoting regulatory action.

Government-procurement policies have not encouraged technological innovation in the banking sector. The government has been slow to adopt new electronic-banking technologies, such as direct-deposit and electronic-data interchanges. The federal government is faced with a real dilemma, however. As the main issuer of mail supporting Canada's postal system, the government has been reluctant to put family allowance, welfare, and pension payments on direct deposit. In addition, the government's policy of dividing contracts proportionally among the banks is seen as another deterrent to innovation. On the other hand, it can be argued that the technology levels of Canadian banks have not been hurt by these policies. In any event, the government is definitely speeding up its movement to electronic payments.

The government in its regulatory role must strike the right balance between competition and the accessibility of financial services on the one hand, and solvency and confidence in the banking system on the other. On balance, the government should continue to remove barriers to investment from abroad and facilitate the entry of foreign firms while gaining reciprocal treatment for Canadian

companies abroad. It should remove the remaining barriers to trade in financial services. Such barriers are limiting innovations. At the same time, it should streamline regulations and cooperate with other countries to enforce better disclosure and supervision of financial institutions. The current proposals for deregulation in the sector should be implemented.

As a regulator, the government can also influence the nature of competition in the telecommunications sector. Canada's existing telecommunications system is one of the best in the world from a technological viewpoint. However, the banking industry believes the conditions under which that system was developed are subject to increasing challenge. The federal government, the industry believes, must respond with a profoundly different national telecommunications policy. A recent major study of telecommunications, *The Power of Choice*,[89] published by the Canadian Bankers Association, suggests deregulation in Canadian telecommunications to enhance competition. This is also supported by the telecommunications-equipment industry in general. (Our own research would also concur: see Science Council of Canada Sectoral Technology Strategy Series, No. 1: *The Canadian Telecommunications Sector*.)

The Canadian banking sector is particularly concerned about regulatory constraints on competition in the telecommunications industry. Indeed, the biggest inhibitor to shared networks in the banking sector is the cost of the telecommunications. Comparable transactions cost five to six times more in Canada than New York State. There is simply no way that so vital a function as telecommunications can continue to be so expensive to the industry.

The banking industry believes telecommunications policy must be recast to incorporate a new role for users that will give them greater influence over the development and pricing of telecommunications services. Canadian financial firms that want to be competitive, especially in international markets, must increasingly treat telecommunications not simply as a cost of doing business but as a strategy that provides competitive advantage.

Finally, through dissemination of information, the government can encourage selective value-added proprietary applications that build on shared technology to provide differentiated products that lead to a sustainable competitive advantage.

Conclusion

The 1990s will be a period of rapid change and uncertainty in the banking industry. Weak players will lose share on the one hand to large, full-line financial-services firms, and, on the other, to specialized niche players. Distribution channels will be the key to survival, and there will be rapid growth in inter-institutional networks.

Global banking — focused more on corporate and commercial banking than on retail — will be dominated by the top 25 banks; of these, 18 are located in Japan, six in Europe, and one in the United States. These banks will provide services to all markets, and the top 100 banks will provide most services to many markets. Canada's largest financial institutions will have a multinational orientation but will likely not be considered global players, unless the rationalization that some Canadian industry spokespeople advocate comes to pass.

Technology Trends

The pace of technological change will accelerate, and product life cycles will continue to shorten. Because banks will be able to hold a technological advantage only for shorter periods, they will be forced to speed up product development. One bank has said that, by 1995, it plans to be able to turn a product idea into an operating system within 90 days (a comparable system today takes one year to develop). In general, from a technological viewpoint, Canadian banks are currently state of the art, and no technology to overturn this competency seems imminent. Technology within the banking sector will not be the critical near- or medium-term issue, given the Canadian banking sector's current capabilities.

Competitive Pressures

Increased competition for existing and new customers will lead to further rationalization within the industry.

Canadian financial institutions must also face the threat posed by third parties, such as value-added network suppliers, who are seeking opportunities to leverage their investment through increased banking-related services. For example, IBM is developing an electronic data-interchange (EDI) network that is encrypted end to end, bypassing intermediaries like banks. Indeed, some bank executives say that U.S. value-added networks are the largest threat they face, which is one reason some banks are investing heavily in EDI and electronic funds transfer at the point of sale (EFTPOS).

Still another threat may come from large near banks in the United States or elsewhere (for example, the treasuries of major multinational corporations) that possess large pools of capital.

Nevertheless, the vital competitive issue remains the linkages between Canadian banks and their customers. Will Canadian-based firms grow? And will Canadian banks be financing them?

Appendix: Framework for Technology Strategies

As part of the methodology for analysing each sector, the Science Council of Canada sought whenever possible to assess company technology strategies according to the following framework:

	adopt and adapt	innovation	breakthrough
product			
process			

Strategy Classes

Adopt and adapt: Acquire a technology and adapt it to serve as a competitive platform.

Innovation: Incrementally improve on winning technology to get greater market share or maintain competitive edge.

Breakthrough: Seek to create a discontinuity in the marketplace, thereby leaping ahead of the competition.

The company case studies generally looked for at least seven key dynamics influencing a company's technology strategy:

- three internal dynamics:
  - competitive position,
  - capacity for innovation, and
  - strategy and vision; and
- four external dynamics:
  - customer demands,
  - competitive rivalry,
  - supply condition, and
  - available technology.

The methodology also incorporated essentially a three-step process for each sector. In the first step one or more contractors analysed the main elements in the competitive and R&D performance of the Canadian sector and its leading foreign competitors. The second step included evaluation of the contract report(s), discussion with contractors and other experts, additional in-house research, and preparation of a draft Council report. In the third step, external reviewers commented on one or more drafts of the Council report, which were then revised and refined as required, drawing on the advice of the liaison person for that sector on the Steering Committee (see Acknowledgements). For some sectors, the third step also involved several external reviewers in a small workshop, one part of which

helped define some elements of a potential action plan for the sector. The report was then submitted for final approval to the Executive Committee of the Science Council, before being forwarded to Industry, Science and Technology Canada.

Notes

1. "International banking survey," *The Economist*, 7 April 1990.

2. Canada Consulting Cresap, "Banking," Contract report prepared for the Science Council of Canada, 1991, (unpublished), 5.

3. Ibid., 8.

4. Ibid., 10.

5. Ibid.

6. Ibid., 12.

7. Ibid.

8. Ibid., 18.

9. Ibid., 13.

10. Ibid., 14.

11. Data provided by the Canadian Bankers Association.

12. Canada Consulting Cresap, op. cit., 8.

13. Ibid., 9.

14. Data provided by Industry, Science and Technology Canada.

15. Canada Consulting Cresap, op. cit., 10. It may be worth noting that "assets under administration" may exaggerate the size of trust-companies' assets, relative to those of banks, owing to the trustee nature of some of the trust companies' lines of business.

16. Ibid., 11.

17. Ibid., 23.

18. Ibid., 22.

19. Ibid., 18.

20. Ibid., 20.

21. Ibid.

22. The Bank of Canada, which is wholly owned by the Government of Canada, is Canada's central bank or money manager. It was created ". . . to regulate credit and currency in the best interests of the economic life of the nation, to control and protect the external value of the national monetary unit and to mitigate by its influence fluctuations in the general level of

production, trade, prices and employment, so far as may be possible within the scope of monetary action, and generally to promote the economic and financial welfare of Canada." *Revised Statutes of Canada, 1985*, Vol. 1, Chap. B-2, Preamble.

23. Canada Consulting Cresap, op. cit., 7.

24. Ibid., 13.

25. Ibid., 14.

26. Ibid., 15.

27. "A legal document that establishes, represents, or evidences a right or rights to property. Although there are many different legal definitions of the term, as ordinarily used, a security refers to a note, bond, option, stock, or evidence of indebtedness," *The McGraw-Hill Dictionary of Modern Economics*.

28. Canada Consulting Cresap, op. cit., 36.

29. Ibid.

30. Ibid., 30.

31. Ibid., 45.

32. Ibid., 31.

33. Ibid., 126.

34. Ibid., 45.

35. Bill Sapporito, "The bill is due at American Express," *Fortune* (18 November 1991): 99.

36. Canada Consulting Cresap, op. cit., 81.

37. Ibid.

38. Ibid.

39. Ibid., 82.

40. Ibid., 83.

41. Ibid., 84.

42. Ibid., 85.

43. Ibid.

44. Ibid., 86.

45. Ibid.

46. Data provided by the Canadian Bankers Association.

47. Canada Consulting Cresap, op. cit., 66.

48. Ibid., 91.

49. Ibid., 46.

50. Ibid.

51. Ibid., 91.

52. Ibid.

53. Ibid.

54. Ibid.

55. Ibid., 47.

56. Ibid., 48.

57. Ibid.

58. Ibid.

59. Ibid., 49.

60. Ibid., 50.

61. Ibid.

62. Ibid.

63. Ibid., 51.

64. Ibid., 52.

65. Ibid., 94.

66. Ibid., 97.

67. Ibid., 96.

68. Ibid., 95.

69. Annual reports of French banks, 1989.

70. Canada Consulting Cresap, op. cit., 98.

71. Ibid., 99.

72. Ibid., 78.

73. Ibid., 79.

74. Ibid., 66.

75. Ibid., 70.

76. Ibid.

77. Ibid., 41.

78. Ibid., 39.

79. Ibid., 117.

80. Personal communication from The Network Inc. to the Science Council of Canada.

81. For a full discussion of some of these growth variables, see Terence Corcoran, "Are our banks in a growth straitjacket?" *Globe and Mail* (24 July 1991): 132.

82. "Mighty Morgan," *BusinessWeek* (13 December 1991): 64.

83. The following paragraphs draw heavily from Richard Wright, "Key financing relationships in Japan," in *Bridging the Gap*, papers for a workshop organized by the Science Council of Canada in Toronto, 24-25 November 1988.

84. Alex Taylor, "Toyota," *Fortune* (19 November 1990): 69.

85. Carla Rapaport, "Why Japan keeps on winning," *Fortune* (15 July 1991): 76-85. The article's title is certainly forceful.

86. Alfred Steinherr and Christian Huveneers, *Universal Banks: The Prototype of Successful Banks in the Integrated European Market?* (Brussels: 1990) Center for European Policy Studies.

87. Robert Korthals, President, Toronto-Dominion Bank, speech to the 1991 annual meeting of the Canadian Bankers Association, as quoted by Terence Corcoran, *Globe and Mail* (24 July 1991): B2.

88. Donald Fullerton, Chairman, Canadian Imperial Bank of Commerce, as quoted by Heather Whyte, *Financial Post.*

89. Canadian Bankers Association, *The Power of Choice* (Toronto: 1991).